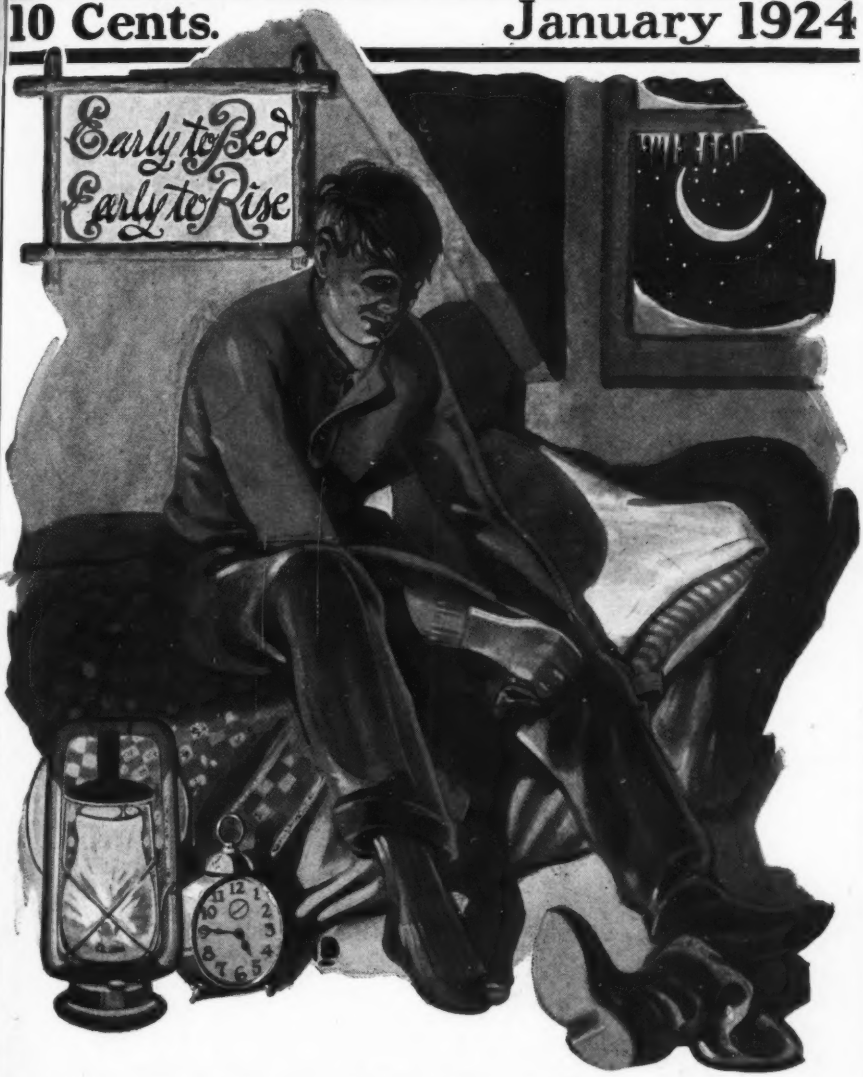
Better Crops

The Pocket Book of Agriculture

10 Cents. January 1924



In this issue - Prize Essay Award - Dean Stewart - Dr. Frank Crane - Albert Hansen - Charles J. Brand - Jeff McDermid

The bottom of the barrel—

THERE was an old lady who took only a spoonful or two of flour from a barrel each day and noticed that the bottom was still far away. She exclaimed, "Why, this barrel of flour will last *forever.*"

But the bottom finally came.

In your soil there are three plant foods—nitrogen, phosphorus and potash. Every crop takes its toll of each of these three elements. Some of the food is replaced by growing legumes, by rotating crops, and by returning the farm manure. But do the farmers in your county return *all* the potash that is removed? If they do not, there will come a day when the "bottom of the barrel" will be reached. Manure alone will not do it. The farmer must add potash to his mixed fertilizer, or buy mixed fertilizer that contains plenty of potash.

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BETWEEN OURSELVES

THE most important part of my job as editor of BETTER CROPS is to keep in touch with you and our other readers.

With each succeeding number of the magazine, I am trying to make improvements. I am particularly trying to secure timely, lively, interesting articles that will hit home with you.

The only way I have of knowing whether I am succeeding is from your suggestions and criticism. Write me your opinion of this number. Tell me frankly how we can make the magazine of more service to you.

For the February BETTER CROPS I have secured several articles that I feel sure you are going to vote "the best yet." Among them are the following:

An Exclusive Interview with
Secretary of Agriculture HENRY C. WALLACE

DANGEROUS AGRICULTURE
by Charles W. Gapen

This is the beginning of a series of interesting accounts of the perils encountered by workers of the Department of Agriculture.

MARKETING COTTON COOPERATIVELY
by R. H. Tingley

Mr. Tingley is a great expert on cotton and has written a timely article on the present situation in cotton marketing.

There will be a number of other worth-while articles and the usual departments and features—and, of course,

Yours truly,

Jeff

P. S.—If you want to send some friend a year's subscription to BETTER CROPS, *you can make him happy at the small cost of* $1. *Just mail his name, address and check or money order to me.*

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Better Crops

The Pocket Book of Agriculture

VOLUME I NUMBER FIVE

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¶ A "*Grab-and-Run*" *lunch in Georgia. Nothing so sweet as a "swiped" banana.*

BETTER CROPS

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Are Economical Wives Economical?

A startling question with an even more startling answer by

Jeff McDermid

SAUNDERS NORVELL, the wizard of hardware, sat one day in his office at the front of the main building of the Norvell-Shapleigh Hardware Company, in St. Louis.

IN the doorway stood a woman whom he had never seen. She wanted a check. She explained that she was the wife of one of his salesmen who was out on a long trip, and had been instructed by her husband to step in on the first of the month and collect his salary. She showed Norvell her letter of instruction—Norvell reached for it; touched her hand. She withdrew the hand blushingly.

"My, but your hand is hard!" Norvell exclaimed. The poor woman did not know whether to be insulted, alarmed for her safety, or merely displeased.

"It has a right to be," she said. "I do my own washing, dress and take care of five children, and do all my own housework. I have no time to fuss over myself—no spare minutes to soak my hands in cold cream. Dishwashing and sewing and peel-

ing potatoes and washing underclothing do not improve the hands. Of course they are rough and hard! *What about it?*"

"Why do you do all this?" Norvell gently questioned.

"To help my husband save money!" was the earnest reply.

"And are you really saving money?" Norvell asked.

"I should say yes!" the now garrulous soul retorted. "On the first of every month I deposit John's check. Then I draw a check for fifty dollars to the savings account, ten dollars to the Home Building and Loan Association and five dollars to the Christmas Savings Club. All told that makes sixty-five dollars each and every month that we put away for a rainy day. And if I didn't wear my hands off doing my own work we would never have a cent. As it is, we have nearly six hundred dollars put away and some day we are going to build our own home—we have it all planned on paper."

UNDER his breath Norvell said: "And of such as these is the salt of the earth." But aloud he questioned, "And if you hired a girl to do your housework, a laundress to do your washing and spent ten dollars a week on yourself in the form of beauty parlor treatments, hairdressing, manicures, and turkish baths, you could not save a cent, could you?"

"Of course not!" the woman indignantly replied, now getting hot under the collar.

"Well, as your husband's employer, Mrs. Jones, that is exactly what I am going to ask you to do! I want you to go home, hire a laundress, a maid and whatever help you need around the place. Then go to a beauty shop and get yourself into shape where you feel human and respect yourself. Spend a little money getting your hands softened up. I have heard that certain kinds of rubber gloves worn at night tend to bleach and soften the——"

"Why, you're crazy, Mr. Norvell!" burst out the woman. "Begging your pardon, sir, of course! I know you mean well, and there is nothing on earth I would like to do as well as to spend a little money on myself; but John and I have our course all planned out. And I am willing to do my share now, that I may live comfortably later in life. I know red hands do not appeal to John. He often complains that I do not look "appetizing," as he calls it, when he comes home off the road. But it is better to have red hands and money in the bank, than white, tapering fingers and be broke all——"

It was now Norvell's time to interrupt.

"It is not my idea to have you go broke, madam; far from it. You are typical of the average conscientious, hardworking wife who spends every waking moment drudging, squeezing and saving in a mistaken idea that she is helping her husband save money for the future."

"Now," he went on "your husband is bringing in around $200 a month; perhaps nearer $250. I haven't paid particular attention to his commission checks the last sixty days. But, anyway, we will say $250. You save $65 of this each month. That means that it costs you $185 to live. Now, if I can show you how to increase his income each month by three or four times $65, would you be willing to get your laundress, your girl-of-all-work, and spend a little money on yourself? Provided that you are still able to save $65 a month—or more?"

(turn to page 69)

Save That Million!

¶ Here's a good suggestion from

Hi Fedderson
County Agent, Mahaska, Iowa

VIA the eye is the shortest route to the brain. Movie enthusiasts tell us that the moving picture is the best educator, but there is one method which beats that. It's the actual doing of a thing right when your pupil can see you and help you do it that gets the real results. And that's the way we get farmers to treat their fence posts before setting them. Here in Iowa we spend approximately $6,000,000 each year on fence posts for new fence lines and for replacements. This is an average of $30.00 for each of our 200,000 farms, but what's $30.00 compared with the expense of *digging* holes to accommodate $30.00 worth of fence posts?

In order to encourage a cutting down of this monetary expense and to get away, partly at least, from the drudgery of digging post holes, we rig up an outfit to show how to lengthen the life of usefulness of a fence post.

We select well seasoned posts of different varieties of wood to be treated in order to show the difference in the degree of penetration in a soft wood as compared with a hard wood. The deeper the wood preservative penetrates the more years are added to the life of the post. This encourages the use of the softer, quicker growing trees, such as willow, cotton-wood and maple for posts and allows the oak, walnut and other harder woods to be put to some better use.

All the equipment necessary may generally be found on the average farm. About forty bricks, a few iron rods and a steel drum with one end removed, about six feet of stove pipe and you are ready to go. The bricks are laid up in a circle as large as your drum with an opening on one side for a fire door and with the stovepipe acting as a smokestack on the other side. Short iron rods are laid across the top to help support the drum. Bank the brick fireplace with dirt to keep the heat in.

We use gas tar as a cheap substitute for creosote and treat the butts of the fence posts hot for from three to four hours, depending on the variety of wood being treated. After treating the butts in this manner it is well to provide a long tank in which to cold-treat the entire post, especially when the softer woods are being utilized.

Treating fence posts à la Fedderson

The Winning Essay

What Fertilizers

By C. P. Blackwell

Clemson Agricultural College, S. C.

¶The first prize essay contest conducted by BETTER CROPS *closed on December 1st. The subject "What Fertilizers Have Done for My County (or State)" apparently struck a popular note—for we received over twice as many manuscripts as we anticipated. ¶I turned these over to the three judges, Mr. E. V. Thompson, of "Country Gentleman," Mr. Herbert Collingwood, of the "Rural New Yorker" and Mr. V. E. Pratt, the Publisher of* BETTER CROPS. *In their opinion, Mr. C. P. Blackwell had submitted the best essay. They all agreed, however, that the choice had been difficult to make, owing to the number of excellent manuscripts submitted. ¶The $50.00 in gold was sent Mr. Blackwell on December 19th, and I imagine it was a pleasant Christmas surprise package. I'm sure you join with me in congratulating Mr. Blackwell heartily. I also want to thank everyone who took part in this contest. From time to time, I hope to publish some of the best of the other essays submitted.*

Watch out for our next contest!

Jeff

WHEN the native vegetation was removed from the soils of South Carolina they soon lost their native fertility. This was due to the fact that the state receives a very high annual rainfall and a large part of this comes in the fall and winter while the soil is protected by no growing crop. The soils of the state continued to decrease in fertility until the situation became serious. Farmers could no longer produce profitable crops, and as a result many left their homes here and moved westward to settle on the virgin lands of the west where better results could be secured. It finally became apparent that, unless something could be done to improve the fertility of our soils, the state could not maintain a prosperous population, as agriculture was the chief and almost only industry in the state.

Prior to the war between the states, no very accurate yield records are available. From 1866 to the present time we have a record of the yield per acre for each of our leading crops. These records show that for the twenty-year period, 1866 to 1885, the average yield of lint cotton in the state was 150 pounds per acre; corn, 9.3 bushels; oats, 11 bushels; wheat, 6 bushels. Then something happened. The yield of cotton began to rise. For the ten-year period, 1886 to 1895, it went to 159 pounds. This was a small gain, but significant. The next decade, 1896 to 1905, saw a better gain, with an average of 196 pounds. From 1906 to 1915 the average yield increased to 221 pounds. The average for the three years just before the appearance of the boll weevil was 250 pounds.

in the BETTER CROPS *Contest*

Have Done for My State

This was a gain of 66⅔ per cent. over the twenty-year average from 1866 to 1885. Other crops followed the same course. Corn made an average yield for the ten-year period, 1911 to 1920, of 17.7 bushels, or a gain of 90 per cent. For the same period oats rose from 11 bushels to an average of 20.64 bushels, or a gain of 87 per cent. Wheat went from 6.1 to 10.8 for the same period, or a gain of 77 per cent. This was an average gain for the four crops of 80 per cent. in a period of approximately thirty years. Such gains, when averaged over a long period of years, could not be due to climate or accident. What caused this tremendous increase in the yields of our crops?

The Prize Winner
MR. C. P. BLACKWELL

Coincident with the beginning of this increased productivity, several other things happened. The South Carolina Agricultural Experiment Station was established and began its work of investigating methods of soil and crop improvement along with other lines of work. Clemson Agricultural College was founded and began to preach its gospel of better seed, crop rotations, legumes, and fertilizers. The gradual adoption of some or all of these practices by many of the farmers of the state was responsible for the increased production noted above.

The object of this paper is to fix as definitely as possible the responsibility of one of these factors, namely, fertilizers, for these results. In order to do this the writer has worked out the coefficient of correlation between the yield of the various crops and the amount of fertilizer used for a period of thirty years, this being the approximate time over which we have a definite record for the entire state. This correlation is as follows for the three crops used: Cotton $.673 \pm .0673$; Corn $.865 \pm .0301$; Oats $.844 \pm 0.354$. This means that commercial fertilizer deserves credit for 67.3 per cent. of the increase in cotton, 86.5 per cent. of the increase in corn and 84.4 per cent. of the increase in oats. The remaining percentages are undoubtedly due to the (*turn to page 65*)

What Can COOPERATIVE

¶ In this article, Dean Stewart contributes some sound, common-sense thinking on one of the biggest problems of the day—the efficient marketing of farm products.

AN ancient Chinese philosopher has well said, "Public prosperity is like a tree; agriculture is its roots, industry and commerce are its branches and leaves. If the root suffers, the leaves fall, the branches break, and the tree dies."

THE truth of this bit of ancient philosophy has never been better demonstrated than during the past three years. The rapid fall in farm prices in 1920 and the resulting depression among the farming population was immediately felt in all industries, as demonstrated by unemployment, closed mills, factories, smelters, and failures in many lines of industry. The hesitancy with which business even now looks upon the revival of prosperity is due in a large measure to the still prevailing agricultural depression. There is a general feeling that there will be no permanent prosperity until the situation confronting the farmer, whatever may be its cause, has been cleared up.

What shall we do to save American agriculture? Various proposals have been made. One of the earliest was to have some one, preferably the government, finance European nations so that they could buy our agricultural products. Another was to establish by law a fixed price for certain food products which would insure cost of production plus a reasonable profit. Neither of these proposals made much headway. The proposition of establishing a fixed price for certain farm commodities will undoubtedly be brought to the early attention of Congress this winter.

At present various proposals are being made such as:

(1) Revive the U. S. Grain Corporation which handled the wheat situation so favorably during the war.

(2) Since the Grain Corporation made $50,000,000 profit for the government during the war, distribute this profit as a bonus among the wheat growers.

(3) Secure an agreement among the farmers to restrict the acreage

MARKETING *do for the farmer?*

By Dean Robert Stewart
College of Agriculture, University of Nevada

devoted to wheat and thus decrease the wheat surplus.

(4) Force by law a reduction in freight rates on the railroads of the country.

(5) Have the government give an export bounty on wheat.

(6) Increase the tariff on wheat from foreign sources.

(7) Create a government commission to promote cooperative marketing among farmers, particularly the wheat growers.

(8) Have a special session of Congress to consider the agricultural situation and to "do something" to correct the situation.

These proposals have been made in all seriousness and most of them will be given earnest consideration by Congress this fall.

The situation is a serious one. It is true that taxes are too high on farm land and the cost of living is too high, due to the advanced cost of the things the farmer must buy and the comparative low value of the things he has to sell. The products of his labor and investment have not been marketed to the best advantage. It is strange that all of the proposals made to remedy the conditions affecting the farmer, if adopted, would result in the expenditure of more government money, which must come from taxation!

The farmer is far from being a failure or a bankrupt and he is not saying very much. He is leaving all that to his would-be saviors. He is going right ahead preparing for next year's crop. But he is doing a lot of real thinking on the subject. Cooperative marketing is appearing on his horizon as a welcome beacon light to guide him by the present shoals.

It is important, however, that all concerned, the farmer himself, the business man, and the public, get a proper perspective regarding cooperative marketing of agricultural products so that all may have a clear conception of what it can actually do and also what it cannot do. In order to achieve this result it is necessary to consider certain fundamental facts.

The farmer is no longer self-sufficing. The products of his farm must be transported, often great distances, to the mar-(*turn to page 63*)

PROFITABLE FERTILIZATION

Principles that underlie Productive Farming

By *Prof. Paul Wagner*

¶ Prof. Wagner is director of the Experiment Station at Darmstadt, Germany. ¶ His official experiments in plant nutrition and in the use of artificial fertilizers have given him a world-wide reputation. ¶ In this article are presented some of his most significant conclusions.

THE term "manuring" or "fertilizing" as employed here means the use of the manurial substances—potash, phosphoric acid and nitrogen—for the purpose of increasing the growth of plants. In practical farming the object is to get the greatest growth for the least amount of these manurial principles, or in other words, to avoid using manures or fertilizers wastefully. A crop needs certain quantities of potash, phosphoric acid and nitrogen, and must have them all to make the crop; but there is a way to make certain crops fertilizer-producers as well as crop-makers, as shown by the following experiments.

The first experiment shows the effect of attempting to grow certain crops without nitrogen.

Figure 1 shows wheat and barley, grown in pots. Of the four pots of each experiment, two (marked O) were fertilized with potash and phosphoric acid, the remaining two (marked N) also received potash and phosphoric acid, and in addition nitrogen in the form of nitrate of soda. The increase of growth in the pots where nitrate of soda was used, shows the effect of nitrogen. Stated in figures, the gain was three to one. This experiment was made with soil known to be deficient in nitrogen, and serves to show beyond doubt that these two crops cannot be grown to advantage unless there is enough nitrogen supplied to balance properly the potash and phosphoric acid.

However, results from the same experiment on *legumes* show that some plants, at least, do not require any considerable amount of nitrogen manuring; and that it would be wasteful to use much nitrogen fertilizer on such.

We have gone to some trouble to illustrate this point, as it is the basis of profitable manuring, and must be fully understood as a fact. For the purpose of profitable manuring, plants may be divided into two classes: First, those which *need* nitrogen manuring, and second, those

which *do not need* nitrogen manuring. Among the plants of the first class are wheat, corn, oats, rye, barley, potatoes, beets, turnips, cabbage, fruits, etc. Among those of the second class are peas, beans, vetches, serradella, cow peas, alfalfa and all the clovers. Plants of the second class are called legumes. They have the power of drawing the nitrogen from the air and changing it into forms suitable for plant food. This power is due to the action of certain bacteria which infest the roots of plants of this class, and whose presence is recognized by the growth of little knots on the roots, the so-called root "nodules."

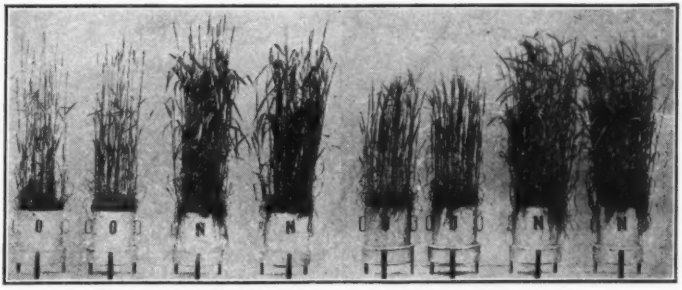


Fig. 1. Effect of nitrogen fertilizer on grain.

We have spoken of potash and phosphoric acid to *balance* the nitrogen; this means that if a plant is supplied with a certain amount of nitrogen in plant food, a certain amount of potash and phosphoric acid must also be supplied. If the amount of nitrogen is reduced by one-half, the potash and phosphoric acid also may be reduced by one-half; if this is not done, the extra half of the potash and phosphoric acid would not be of any use, there being no nitrogen to associate with the two ingredients to make a complete plant food. A complete plant food, whether farmyard manure, commercial fertilizer, or a home-made mixture of fertilizer chemicals, should contain such quantities of potash, phosphoric acid and nitrogen, that, as nearly as may be, all of each is taken up by the crop. A manure or fertilizer thus proportioned is said to be well balanced. In practice, however, we more often use unbalanced fertilizers to supply a soil deficiency or to supplement manures or legumes. The origin of the soil, the previous cropping, the kind of rotation and the particular crop to be grown determine to a great extent the formula of the fertilizer that is likely to prove most profitable.

In the figure referred to in the earlier part of this article, an illustration is given of an attempt to grow plants without nitrogen, and, through the use of pictures taken from actual photographs, it was shown that, except in the case of the class of plants called legumes, plants cannot make any useful growth w i t h o u t n i t r o g e n. Had we withheld either potash or phosphoric acid, no considerable growth would have been made in the case of either the barley or the legumes. The illustration was made, however, not to show that any crop or crops can do without one or another of the elements of plant food, but to show that a certain class of plants can supply their own nitrogen. Legumes must have nitrogen as well as other plants, but do not need

much nitrogen manuring. This one point is the basis of the most important detail of profitable manuring.

Manuring, as already stated, means the use of potash, phosphoric acid and nitrogen in growing a crop. Profitable manuring includes the selling of the crop for an increase over the cost of the manure, cost of seeding, tillage, and other necessary expenses. Thus plant food may be regarded as something which is bought to grow crops and sold as crops to repay for the investment. Therefore, the potash, phosphoric acid and nitrogen converted into crops should always be sold at a much higher price than they cost in the form of plant food. Nitrogen is the most expensive of the three elements of plant food and costs from two to three times as much per pound as either potash or phosphoric acid; the latter two cost about the same per pound. A rough example will illustrate the broad general principles of profitable manuring at its best. Assuming that potash and phosphoric acid cost each 5 cents per pound, and nitrogen 18 cents per pound, and that to grow a fair crop of clover requires per acre 88 pounds of potash and 15 pounds of phosphoric acid, there would be a total cost for plant food of $5.15 per acre. The crop will contain 83 pounds of nitrogen, 88 pounds of potash and 15 pounds of phosphoric acid, with a value as follows:

Nitrogen, 83 lbs. at 18 cts.	$14.94
Potash, 88 lbs. at 5 cts.	4.40
Phosphoric acid, 15 lbs. at 5 cts.	.75
Total	$20.09
Fertilizer cost	5.15
Apparent gain	$14.94

Under average conditions about two-thirds of the apparent gain may be real, since legumes take some nitrogen from the soil, current opinion being that on good soils about one-third is secured from the soil and two-thirds from the air, if the plants are well inoculated.

While these results are theoretical, pure and simple, still they represent the problem of using legumes profitably. In many crops the margin of profit is narrow, and it is only by making use of legume nitrogen that the results may show a balance on the right side. It is not enough that a farmer in these days must know the nature of manures generally, but he must also know how to make the most of each and all of them.

Fig. 2. Different results from legume and non-legume green manure.

By green manuring is meant the growing of crops for the purpose of plowing them into the soil to increase its fertility. One of the ob-

jects of green manuring is to enrich the soil in organic matter, which is valuable, especially with soils that are either too loose or too stiff. The improvement consists in bettering the mechanical texture, making soils more retentive of moisture and consequently less subject to the effects of drouth. The most important feature, however, in connection with green manuring lies in the use of legumes, because these plants are valuable not only for the organic matter they produce, but also for the nitrogen they absorb from the atmosphere, which is useful as plant food for succeeding crops. Plants which are not legumes do not have this property of taking nitrogen from the air. Whatever plant food they contain has been taken from the soil.

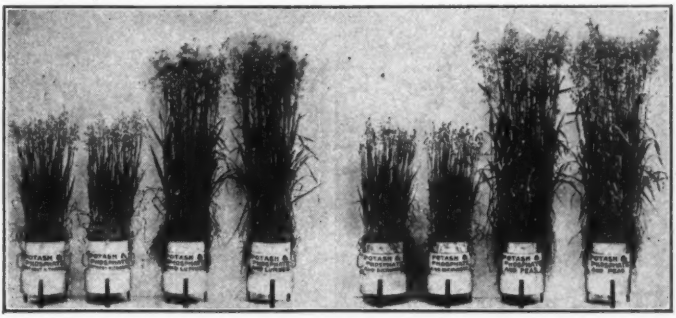


Fig. 3. Different results from legume and non-legume green manure.

Some interesting experiments were made showing the value of legumes for green manuring.

Figure 2 is from a photograph illustrating one of these experiments. The four pots to the left were planted with oats and all of them received sufficient potash and phosphoric acid, but the first two were not supplied with nitrogen, while the other two received an ample supply. The difference in growth shows the effect of the nitrogen added to the potash and phosphoric acid. The four pots to the right (also planted to oats) received potash and phosphoric acid in the same manner, and all four were green-manured, the first two by a crop of mustard, the second two by a crop of vetches. These green-manure crops were grown in the pots the previous season and worked into the soil.

As will be seen from the picture, the effect of mustard and vetches, when used as green-manure crops, is strikingly different. Green-manuring with mustard (a non-legume) failed to supply the nitrogen needed, and a very poor crop of oats resulted —practically no better than where neither nitrogen nor green manuring was used; while vetches (legumes) being nitrogen gatherers, supplied the nitrogen needed to make a good crop of oats, and proved equal to the nitrate of soda in the first case.

Figure 3 refers to another important experiment bearing on green manuring. All eight pots received potash and phosphoric acid alike. The first two pots received no nitrogen, second two were green manured with lupines, the third two with buckwheat, and the fourth two with peas. The results showed the (*turn to page 57*)

Toiling the HAY in the Bruley

¶ Farming has its attractions—when you look at it right. ¶ Read these sage reflections on the subject

By Irving Price

"PAW?" answered the boy, "he's toiling the hay in the bruley."

Cousin Tom Sears and I were only an hour's ride north from the Canadian border and the boy had evidently understood our question, but the word-puzzle "bruley" stumped us, and I don't know yet whether I'm spelling it correctly.

"Toiling the hay" was also a new expression to our ears, but one that needed no interpreter. We both had toiled hay and other crops in our own boyhood days until old enough to quit the farm and its toil for the city and business.

We found Paw in the bruley, as directed, toiling the hay, as specified. He was glad to stop and rent us his boat for a few days' fishing on his own terms of fifty cents a day.

We were out of touch with farm life, but could tell that the soil was poor, the crops were thin, and the general atmosphere hopeless. Tom's keen mind reacted indignantly.

"'Toiling' is right," he muttered. "Poor land and the man is land-poor—no fun—no society—no progress—no inspiration—no future. Talk about primitive man———"

Just then a two-pound black bass got on his line and interrupted the discourse. Later quiet settled down, and Tom grew sentimental.

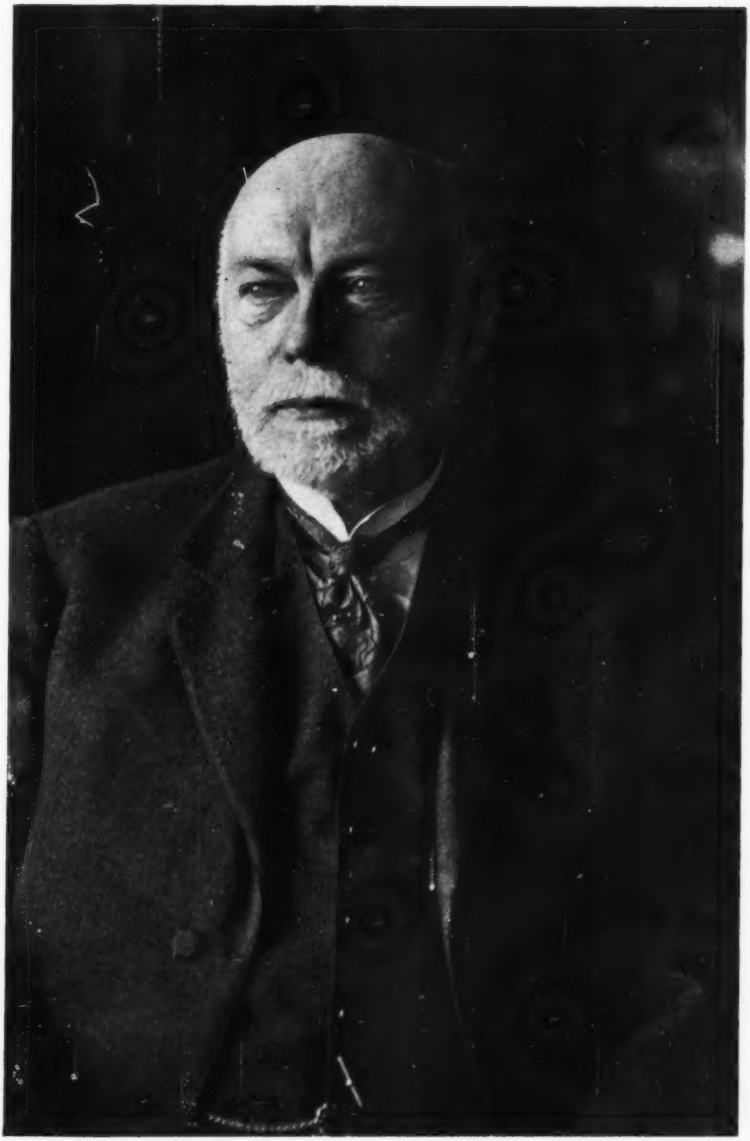
"I was a boy like that on a farm not so many years ago, and such a man I would be to-day if I hadn't had the nerve to strike out for the city. There are other boys right now on the old farm back in New York State, and Lord knows you and I have not kept in touch with them or done much for them in the last fifteen years. Wow!"

THIS time we hooked a double-header, a fish on each line, and toiling the hay interested us no longer, but off and on during the week we discussed it again and finally decided to pay a sentimental visit to our second cousin, Charlie, who had stayed on the farm.

"The place *looks* thrifty," remarked Tom in a (*turn to page 67*)

¶ Dr. C. A. Browne, new chief of the Bureau of Chemistry, U. S. Department of Agriculture. He left the department 16 years ago and, up to the time of his return to take charge of the chemical work, he was in charge of the New York Sugar Trade Laboratory. ¶ The enforcement of the Food and Drugs Act is a part of his work.

¶ *Dr. W. W. Garner, of the U. S. Department of Agriculture, whose discovery of the effect of the length of day on the flowering and fruiting of plants is one of the most important in recent years.* ¶ *He has found that it is not the coming of colder weather that makes plants start the work of making fruit and seed, but the shortening of the hours of daylight. He can produce the same effect at any time by artificially reducing daylight, running the plants into a building in the afternoon and bringing them out in the morning.* ¶ *There are practical applications of this new fact.*



¶ *Dr. Frederick B. Powers, of the U. S. Department of Agriculture, whose discoveries regarding chaulmoogra oil have had much to do with its development as a specific for the cure of leprosy.*

¶ *Professor Milton Whitney, chief of the Bureau of Soils, United States Department of Agriculture, is famous the world over for the work he has done to increase our knowledge of the country's most fundamental resources.*

An Open Letter to Mr. Samuel L. Ewing from E. K. Howe

¶ A copy of this letter happened to come to my attention. ¶ It struck me as such a sensible, straight-forward presentation of important facts that are not generally known that I secured Mr. Howe's permission to print it for the benefit of our readers.

Jeff

Mr. Samuel L. Ewing,
c/o "San Francisco Bulletin,"
San Francisco, California.

Dear Sir:

I have read your article in the San Francisco Bulletin of November 23rd entitled "Potash Industry Success in California is Assured by German Mark Collapse," and it calls forth the questions, "Does the American Potash Industry depend for its existence upon the elimination of competition?" "Must the farmers of the United States be subjected to a Potash famine and the excessive prices of an industry not able to supply a fraction of their requirements?" The answer to both questions is "No!"

As a Native Son, I hope the California industry will continue a success. But as the distributor of German Potash in the United States I can assure you there will always be sufficient potash to supply the needs of our farmers at prices that will pay them to increase their yields and build up the fertility of their soil.

There is no uncertainty of delivery nor disorganization in the German potash industry as has been lately broadcasted throughout the press. The industry is self contained, able to secure all its raw materials and coal within its own organization and any quantity of potash salts can be supplied to meet all demands of our farmers. This does not mean, however, that the American potash industry will suffer, as there is a potential market sufficient for us all.

To give you a clearer idea of the potential business which can be obtained from the farmer as compared with the comparatively small amount of potash now used, we give you herewith two tables. Table A shows the amount of potash imported and produced in the United States between 1913 and 1921, as against actual potash required to make up an average of 5 per cent. in mixed fertilizers, which is considered the average to give the farmer the best minimum results.

TABLE A

The following table shows the consumption of fertilizers in the United States (not including Hawaii) for ten years; the amount of potash required to provide an average of 5 per cent. in these fertilizers; and the imports and domestic production of potash:

Year	Fertilizer Sold in U. S. (Short Tons)	Actual Potash (K20) Required to Make 5% Potash in Fertilizers Sold (Short Tons)	Imports of Potash (K20) (Short Tons)	Domestic Production Potash (K20) (Short Tons)	Total Potash (K20) Used (Short Tons)
1913	6,544,340	327,217	273,124	.....	273,124
1914	7,240,320	362,016	178,610	.....	178,610
1915	5,573,200	278,660	59,114	1,090	60,204
1916	5,390,540	269,527	7,885	9,720	17,605
1917	6,206,540	310,327	8,100	32,573	40,673
1918	6,756,740	337,837	7,957	54,803	62,760
1919	6,891,320	344,566	28,560	32,474	61,034
1920	7,654,220	382,711	199,175	48,077	247,252
1921	4,500,000	225,000	64,379	7,618	71,997

You will see from the above table that there is a very great opportunity for increased sales in this respect, even though the farmer does not increase the use of fertilizers.

Table B gives even more startling figures, for it shows that taking into consideration all of the potash put back into the soil through manures, domestic and imported potashes, there is a minimum annual loss of over one million tons of pure potash, or five times the amount which it is anticipated will be imported and produced in the United States over the coming year.

TABLE B

CROP	Tons actual potash removed from soil in 1 year, based on a ten-year average
Corn	1,783,345
Wheat	304,628
Oats	484,692
Barley	131,799
Rye	24,904
Potatoes	54,512
Hay	1,035,810
Cotton	106,752
Tobacco	48,370
Total	3,974,812

The most extended and careful investigation into the amounts returned in manures and crop residues indicate that not over two-thirds of the plant food removed by crops is returned to the soil under the very best farm practice, while under average practice not over one-half is returned.

Even under the best practice this would indicate that every year there is a loss of 1,054,464 tons of actual potash which is gone beyond hope of recovery.

Our account with the land then stands:

	Tons
Potash removed by Principal Crops, approx.	3,900,000
Recoverable under very best methods, approx.	2,600,000
	1,300,000
Less highest amount imported and produced in any year	273,124
Minimum annual net loss, approx.	1,026,876

The field for increased sales for any supplier of potash is in this potential tonnage that is now being robbed from farm lands throughout the United States, and until the point is reached where supplies replace withdrawals, it is futile for potash manufac- (*turn to page 49*)

The Bunk About Wage Slaves

By Dr. Frank Crane

THE Wage System has been cursed by every tyro in reform. We have heard talk of wage slaves, and the scream that their condition is little better than that of pre-war negro slaves. Indeed, some say they are worse off, as the slave was cared for by his master and felt he was one of the family, while the wage-master is cold, aloof and heartless. ¶All this is pure bunk. ¶You can easily prove that it is by asking any hired man how he would like to be bodily owned by his boss, as was Uncle Tom. ¶To do an honest job for money is the most equitable and the decentest way of doing it. ¶You can prove this by your instincts. ¶When a man approaches you with a proposition, and says he does not want any profit, his soul is above money, and he is actuated by altruism, you punch the button signaling the house detective to keep an eye on him. You only do business with satisfaction with any man when you see clearly that he is going to make a profit. ¶Whoever tries to get something for nothing is a cheat. Beggars are nuisances and the worst type of menace to the poor. It is an open question whether most benevolence, money doling and all gifts do not create more harm than good. ¶The one transaction that is clean as a hound's tooth, square and solid in the eyes of men and wholly acceptable to God, is to pay a man an honest price for his labor or his goods. ¶America is founded on the wage-system. ¶It is the corollary of democracy. ¶It was not devised. It grew. It is a process of evolution. ¶It is the best way we have found so far in which one free man can serve another and lose none of his manhood. ¶It has its drawbacks, because humanity has its imperfections, and it is human. ¶Crafty employers will underpay workers, and lazy workers will swindle employers in all probability to the day of judgment. ¶Get the buying and selling and wages of the world equitably arranged, and thousands of laws would disappear from the statute books, hundreds of charitable organizations would close their doors as no longer needed, fantastic economic theories would vanish as thin clouds, the capital letters of Capital and Labor would be permanently replaced by lower-case and the industries of the world would bound forward as if touched by a magic spur. ¶Be fair, and you will not need that anyone urge you to be kind.

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How the California Almond Achieved Success

By *Charles J. Brand*
Consulting Specialist in Marketing,
U. S. Department of Agriculture.

THE California Almond Growers' Exchange is, to a certain extent, a product of evolution. During the fourteen years of its existence it has been shaped by necessity.

Like all cooperative enterprises, it was born also of necessity. Prior to 1910, the year of organization of the Exchange, the marketing of almonds was chaotic, as is always the case where a product is a luxury and its distribution is left to a private venture inspired only by desire of profit. The almond growers of California found themselves begging speculative elements to move their crops and their importunities met with offers of prices below the cost of production. Those who had to sell, sold; those who did not, let their almonds rot.

FOR a number of years prior to 1910, there were in existence a few local associations of almond growers whose membership was dictated by geographical proximity and, of course, natural communal interest. These made an ineffectual effort to obtain a living price for almonds. By 1910 their ineffectiveness was clearly demonstrated as speculative shippers of almonds were successfully pitting one local association or pool against another.

Something had to be done. The formation of the California Almond Growers' Exchange resulted. It was first a combination of the different local associations or pools existing at the time and these, having associated themselves, went forth and organized other local associations, nine in number all told.

¶ This article concludes the splendid series that Mr. Brand has contributed on the subject of cooperative exchanges.

The first year passed and as time went on, by careful management, the Exchange grew and took shape. Continually those who were in the Exchange labored with their benighted fellow almond growers and gradually the membership grew, year by year, with the formation of local association after local association, until at the end of 1921 it embraced 23 local groups of growers, all bound together into the California Almond Growers' Exchange.

The system worked all right as long as it did not require great sums to receive, process, and market the annual almond crop. The value of the California crops, however, had steadily increased from a total of $300,000 in 1910 to nearly $2,000,000 in 1921. It was a different sized baby that had to be clothed and the financial trousers it had worn were too small.

Although at the beginning of 1922 the Exchange had assets, through careful management, of some $500,000, the five directors confronted the membership of some 3,500 growers with a proposition to liquidate or reorganize, deserting the annual basis and going forward on a five-year crop pooling agreement. The decision of the five farmer directors was instantly met with the opposition of the speculative element in the almond trade. The battle ended in reorganization of the Exchange with a five-year crop pooling agreement carrying a lien on members' land for specific performance of the contract, namely, delivery to the Exchange of the entire almond crop each year for a period of five years and a fine of five cents per pound for every pound of almonds sold in violation of the contract. In other words, against great odds, the Exchange rebuilt in three months a structure which took eleven years to construct originally.

The success of the reorganization was immediately (*turn to page 45*)

¶ Last month we printed an account of the contest for county soil improvement conducted by the Soil Improvement Committee of the National Fertilizer Association and the six county agents who won the awards. ¶ We promised to give you this month the details of County Agent W. F. Gahm's program which won first prize. ¶ Here they are.

The Winning Program *for County Soil-fertility Improvement*

A REMARKABLE achievement, made possible by his ability and foresightedness in planning his work! That is what lies behind the program with which County Agent W. F. Gahm won the first award in the county soil-fertility improvement contest. It was agreed that in ability to analyze conditions correctly, to build a sound plan of attack and to effectively execute it, Mr. Gahm excelled all other competitors.

Scioto County, in the south-central part of Ohio, was the ground on which Mr. Gahm worked. After a study of the soil, four major lines of work were decided upon as constituting a program of improvements:

1. The use of more limestone.
2. The application of more fertilizers of the right kind.
3. The introduction of better crop rotations, including larger acreages of legumes.
4. The rejuvenation of permanent pastures.

The following is the program as it was worked out in co-operation with the county and township farm bureaus, the extension specialists of Ohio State University and community leaders over the past six years.

1918

Recognizing the need for immediate action, and in order to stimulate wide interest, ten preliminary meetings were held in various localities, at which the true conditions were placed before the farmers. In this way, 26 lime and fertilizer demonstrations, located in 12 of the 16 townships, were started. Twice as much limestone was ordered as in the preceding year. Seventy farms were persuaded to keep records, 31 of which were summarized at the end of the year.

"The men in the group of the best five," says Mr. Gahm, "were

producing over $600 with more crops than the average of the 31, practically on the same acreage. How were they able to do so? They purchased $125 worth more of fertilizer than the average of the whole group. All but one of the best five men are regular users of limestone, while but 43 per cent. of the whole group use limestone. Likewise, the men who secured the best crop yields keep more livestock than the average and so have more manure to use on the farm."

County Agent
WALTER F. GAHM

1919

Twelve meetings were held early in the spring. At each, the results of the 1918 work were discussed.

Twelve sweet clover demonstrations were begun; 15 additional limestone demonstrations were started. An investigation of sources of liming material was also instituted. Fertilizer demonstrations on wheat and corn produced results so impressive that even farmers on bottom land, hitherto considered as unresponsive to commercial fertilizers because of its inherent richness, began to use fertilizer.

"Farm management records for this year showed that the five best farmers who kept records produced $56 worth of crops per acre, while the average farm produced $44. This was brought about through better fertility practices as evidenced by the expenditure of $226 per farm for fertility and lime on the five best farms, while the average farm received only $130 worth.

1920

In each township, a community leader was appointed as soils chairman, with the idea of developing them into a county "Soils and Crops" organization. A careful check was made of the previous two years' work.

The results were brought to the attention of every farmer, a number of special field meetings being held for that purpose.

One of the features of the work in 1920 was the County Fair exhibit. Two miniature farms were shown on which records had been kept for two years. The exact feed value of the crops grown on each farm was also indicated. The well-managed farm grew $560 worth more protein per year on seven and a half acres less land than was used on the poorer farm, through the growing of more legumes, made possible by the use of more limestone and fertilizer.

Fifteen soybean demonstrations, totaling 100 acres, were begun. The acreage of soybeans has increased from a few acres in 1919 to over 2,000 in 1923.

Three community soil demonstrations were established "to demonstrate the effectiveness of logical, systematic fertility treatment followed through (*turn to page 41*)

Cocklebur Sprouts *are* DEADLY

¶ A question that has puzzled farmers and scientists for many years is now definitely answered.

By

Albert A. Hansen

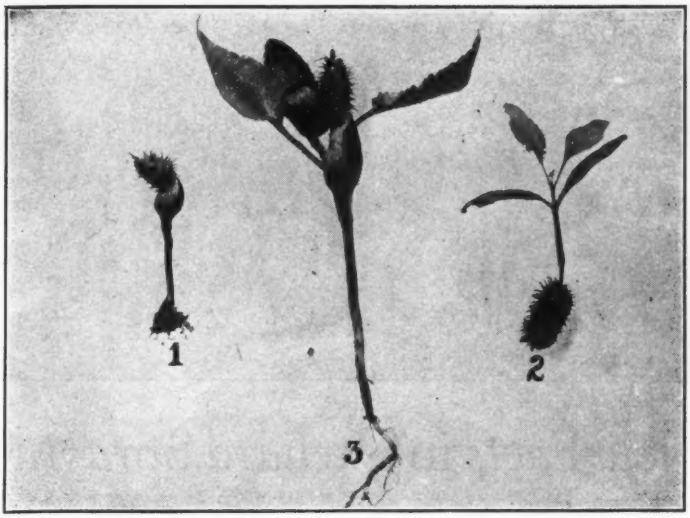
Purdue Experiment Station, Lafayette, Indiana

IS the cocklebur a poisonous plant? This has long been a mooted question and the answer is exceedingly important, since the plant is of common occurrence and losses to livestock that apparently can be attributed to no other cause are quite frequent.

The experimental evidence against cocklebur has been very contradictory. It has been demonstrated that the spiny burs may clog the digestive tract and they may even puncture the intestines and many experimenters were firm in the belief that the only harm to be expected from cockleburs was from the mechanical action. This explanation, however, was unsatisfactory to all who have studied the heavy losses in the field. Strangely, however, numerous feeding experiments failed to get results.

To show how puzzling the situation was let us take for example the case of Foster Hoffman, of Centre Point, Indiana. On the afternoon of May 5th, he turned his swine into the hog lot. Next day seven pigs and a gilt were dead. The writer investigated the case on May 8th and noted millions of young cocklebur sprouts in the hog lot. Suspecting them to be the cause of the trouble, a large quantity of the sprouts were gathered and shipped to the Purdue Agricultural Experiment Station, where they were fed in liberal quantities to pigs. The animals devoured the sprouts with avidity and thrived on the fare. Puzzling, wasn't it?

The mystery, however, has at last been solved. Recent experimental work has demonstrated conclusively that at one stage in its growth the



Cocklebur Sprouts. ¶ *The young plant is poisonous only in the first stage, marked* 1. *Stage* 2 *shows the pair of slender, false leaves which were poisonous, but the poison left when the true leaves above them developed.* ¶ *The picture also illustrates two different methods by which young cocklebur plants emerge from the old burs.*

common cocklebur is a fatally poisonous plant. The poisonous stage is immediately after the seed has sprouted, when the two slender, grass-like false leaves have opened and before the bud containing the true leaves has unfolded. As soon as the true leaves begin to show, the young plant apparently loses its poisonous properties. This explains the failure of the feeding experiments previously mentioned and clears up the mystery of the deaths of thousands of young swine, cattle and sheep throughout the Mississippi Valley states and in the Southwest.

The importance of this discovery to the individual farmer may be judged by citing the case of Will Adams, of Azalea, Indiana. During the spring of 1922 he lost over a score of young swine in the field. The local veterinarian diagnosed the case as septicæmia and Mr. Adams invested over a hundred dollars in antitoxins, but the trouble did not cease. An investigation revealed that not only was the field heavily infested with cocklebur sprouts, but the animals exhibited symptoms typical of cocklebur poisoning. At first their backs arched in a peculiar manner, their heads were thrown backward and there was evident depression and nausea. A few of the poisoned animals frothed at the mouth and most of them lay on their sides and kicked in a convulsive manner, sometimes squealing in evident pain. Frequently the eyes whitened just previous to death. The result was usually fatal in from twenty to thirty hours after the first symptoms were noted. (*turn to page 43*)

© Underwood

New Facts in Orchard Spraying

By H. W. *Anderson*
Illinois Agricultural Experiment Station

A FEW years ago the experiment station workers and the orchardists were satisfied that they knew how to control San Jose scale, the worst pest of the orchard. The standard practise consisted in spraying when the trees were dormant with "winter strength" lime sulphur.

Suddenly, about three years ago, growers in the southern Mississippi Valley region discovered that scale was getting worse and that in spite of heavy and careful spraying with extra strong lime sulphur the scale continued to increase. By the end of the summer their fruit was almost a total loss and many of their trees were dead. This led to an appeal for help to the experiment stations and the United States Department of Agriculture. The answer to their problem was found in the use of an entirely new spray, based, however, on the old oil emulsion sprays.

This new or modified spray was made from two very cheap substances, fish-oil soap and ordinary stationary engine oil. This was doubly fortunate because the cost of protecting orchard trees against insects and fungi had steadily mounted during the past year and the scale spray was one of the most expensive. Furthermore, this spray could be applied in the summer time when the young scale insects were getting established on the new growth.

This spray is used almost exclusively at the present time by growers in the Middle West, where scale has become so serious as to kill out many of the best orchards. It is fairly easy to make and will remain in a good condition for months. The formula and method of preparation is as follows:

Stock Solution

Diamond Paraffin Oil.....1 gal.
Potash Fish-oil Soap .....2 lbs.
Water.....¼ gal.

The water, soap, and oil are poured into a large kettle or steam cooker and boiled for about five minutes. Care should be taken not to burn the mixture. While still hot the mixture should be pumped twice through a spray pump in order to thoroughly emulsify it. This is the stock solution and it may be stored in barrels for future use. Enough should be made at one time to spray the entire orchard at least twice during the season.

The spray mixture to be applied during the dormant season is made by adding 3 gallons of this stock solution to 100 gallons of water. It will mix readily with the water and may be poured directly into the spray tank. The summer strength is 2 gallons to 100 gallons of spray mixture (Bordeaux) or water. The oil may be added to Bordeaux mixture and lead arsenate can be added as in a regular summer spray, but *oil emulsion should never be used with lime sulphur* and if the tank has had lime sulphur in it, it should be carefully washed.

Another method for making this oil emulsion, especially for summer spraying, is to use Bordeaux mixture instead of soap as the emulsifier. This is made by using equal parts of oil and a 4-4-50 Bordeaux mixture. No boiling is necessary. The mixture is pumped through a spray pump at least twice. A good method of making this is to mix it in the spray tank, start the pump and agitator and spray back into the tank, first removing the cap to the spray nozzle. Then, after being satisfied that the mixture has all gone through the pump once, it may be pumped into the barrels where it is to be stored. This mixture is to be used at the rate of 4 gallons to 100 gallons of water or Bordeaux mixture for the summer spray.

The cost of these sprays is much less than the cost of lime sulphur spray, and they are much more effective when thoroly applied. If the scale is found alive in the summer one or more applications may be made at the same time the bitter rot or blotch sprays are applied. All that is necessary is to add the oil emulsion to the regular Bordeaux-lead-arsenate spray.

A Convenient Peach Spray

Credit is due the New Jersey Experiment Station for developing an easily prepared summer spray for peaches. The old self-boiled lime sulphur spray was always a bugbear for the peach growers. It took skill and patience to prepare it properly. Also lump or stone lime was used and this article is now hard to find on the market and will not keep well. The formula and method of preparation is as follows:

Finely ground sulphur (usually called superfine sulphur)	16 lbs.
Hydrated lime	8 lbs.
Calcium caseinate (Kayso or other similar brands may be used)	1 lb.
Water	100 gal.

The sulphur, lime, and caseinate (and powdered lead arsenate if it is called for in the spray) are mixed dry and sifted thru a fine sieve (about 20-25 mesh to the inch). This mixture may then be sifted directly into the tank while it is being filled, with the agitator going, or it may be sifted into a small quantity of water and stirred up into a paste and then added to the required amount of water. Most growers prefer to (*turn to page 43*)

Jeffisms

If you run up against a tough job, jam your embrella down its throat and open 'er up!

To the pessimist every bump on the body politic is a political cancer.

The largest, emptiest instrument in the orchestra makes the most noise and the least music—the bass drum.

Blessed are the meek, for they shall pay 40 per cent. inheritance tax.

If ignorance is bliss, don't tell me the world is not happy!

Give me a man who has thrice failed; his feet are on the ground, though his head is still in the clouds.

It isn't what you know you know that helps your progress; it's what you know you don't know that spurs you on.

Don't be a lightning bug, with your headlight on your caboose; look ahead.

Jeff

Russia's Grain Harvest Still Below Normal

FROM the Riga Commercial Bank, Riga, Latvia, comes a special bulletin on the Russian harvest of the past year.

Although conditions are steadily improving it does not appear that Russian wheat will be a factor in the international markets for some time to come. There have been rumors that Russia was this year preparing to export large amounts of grain, which would materially reduce exports of American grain.

As the facts are presented in the report of the Riga Commercial Bank, it appears that in Crimea, the grain crops amounted to about 153,000 tons. In spite of the fact that this compares favorably with last year's crops, it is insufficient to satisfy the needs of the population. Harvesting is hindered through lack of credit and cash and grain prices are low.

In the Ukrainian grain market, Russia's largest grain producing province, the crops are nearly normal this year, but prices have fallen almost 50 per cent. from August 1st quotations.

The Siberian crops are reported to be below the average. In Southern Siberia the crops were damaged by drought, but in Central and Northern Siberia they are more favorable. Agricultural appliances are in a very bad state, as the peasants are unable to acquire new machinery, owing to high prices.

It is also interesting to note in the Riga Bank's report that trade conditions in Russia are showing considerable improvement. English, French, German, Dutch, and Polish companies have been organized to work Russian Concessions or to trade with Russia. The English in particular seemed heavily interested in Russian trade and are making rapid strides in developing it.

Tiling Above the Ground!

¶ Fellows, read this and enjoy a good laugh with

F. H. Ley
County Agent, Poughkeepsie, New York

PERHAPS this should go in the "Just Among Ourselves" column or be headed "For County Agents Only," for it is of course awfully unprofessional to talk about people among whom we go or to show amusement over the mistakes of another. However, I notice that when the boys get together in the hotel corridors around conference time to while away the midnight hours, one of the favorite pastimes appears to be swapping yarns about the funny things picked up on their travels; and those of us who happen to be in counties near enough to the large cities so that we get a sprinkling of back-to-the-landers among our clientele, have some rather amusing incidents to relate.

Some of these yarns we have often suspected were drawn from what might be regarded as "Old Wives' Tales" or were perhaps the product of a vivid imagination plus a little embellishment for the occasion, but in this brief narrative I shall stick to the honest-to-goodness truth, possibly for the reason that in our humble opinion the facts of the case do not permit the addition of a single detail to render the story more astonishing. I shall therefore relate it "as is."

A few months ago a farmer made inquiry of me over the phone relative to the culture of alfalfa, with particular reference to a drainage problem, as he stated that he was tile draining a field which he hoped to sow to alfalfa in the not far distant future.

After some discussion I told him that I would run out and look the project over as it was difficult to discuss details by 'phone without a personal familiarity with the land under consideration. I had not met the gentleman before, but located the place without difficulty and ran my eye over the field.

IT was a small area of perhaps two or three acres in the shape of an oval, the land sloping from all sides gently toward the center, with the exception of one corner, from which there was a natural outlet with a very moderate grade thru the field and a rather heavy grade into an open ditch beyond.

The owner was at the time working on the drain and approached me with the easy air of a man familiar with the affairs of the world and well pleased with himself and the job he was doing. As I took in the situation somewhat at a glance I noted that there were several rather acute problems to be solved

before alfalfa would be likely to thrive in this situation, among them such rather major questions as drainage, fertility and soil acidity.

The drain had been dug from the outlet at the edge of the field up to and a little beyond the middle and was as well located as would be possible. In fact, if properly constructed, should do the job nicely as there appeared to be no complications in the way of a satisfactory grade or other factors which puzzle the farmer with wet land. However, the whole job looked a little out of kilter, a great deal of dirt had been moved and I noted that the engineer in charge might be an expert along certain lines but was an amateur at drainage.

AT the time of my visit the tile had all been laid and the ditch nearly filled with stone but no dirt had been placed over them and the tile were readily visible down among the boulders. I started in at the outlet to look the job over and noted that the tile were started all right, but as they progressed upstream seemed to be trying to climb out of the ditch and at the end of the first hundred yards were on a level with the top of the ground. At this point a sort of derailing switch had been installed as the next tile lay hidden away in its proper place some two and one-half feet below the surface, and the gradual climb to reach the surface had commenced again.

At the end of the second hundred yards the purpose had been accomplished and the drain tile were again on a level with the top of the ground, but as there was only a little ways yet to go, the derailing process had not been repeated but rather a sort of tressle-work effect had been adopted and the tiles were supported by stones laid on top of the ground until they actually climbed up into the air.

"A 'back-to-the-lander' " was my mental comment, but my comment aloud was "You have done a pretty good job in some respects, but I think the ditch would operate a little better if it was laid on a uniform grade. I would be inclined to take those tile out and get them all down at the bottom of the ditch and all about two and one-half feet below the surface."

"Well," was the reply, "that was the way I had intended having it, but the tile would not seem to come together at the top and I had to keep tipping each one up as I laid it to close the cracks. Then, when I got to the surface, the only thing that I could see to do was to get off to a fresh start."

"As to covering these tiles which are above the surface of the ground," I made inquiry, "won't you have trouble with ice and snow and their getting out of place, and how is the water to get into them when they are above the general ground level?"

"Oh! that's easy enough," replied my farmer friend. "I'll bank them up and cover them with dirt and so keep the ice and snow out and get the ground level up to where the tile are. You see, if I couldn't bring my tile to the water, I thought the next best thing was to bring the water to the tile."

"By the way," was my further inquiry, to develop the history of the case as well as the farmer's experience, "has this spot always been wet? How long have you known this place?"

"Born here fifty years ago," was the reply, "and farmed it ever since."

To County Agents

FIRST of all, I want to express my thanks to you for the way you have received the first four issues of BETTER CROPS. It's mighty fine to feel that you are working for live wire people who appreciate your efforts.

BETTER CROPS is still a long way from perfection, but we're all doing our darndest to improve it with every issue.

In order to be really helpful and serviceable to you, I feel we need to know more about the particular conditions and problems in your own county. This will enable us to give you the kind of information and advice you want. We can also pass on the benefits of your experience to other county agents.

For this purpose I would like to have you fill out the questionnaire below and send it back to me. If you haven't room enough here, send me a letter or a postcard. It's only a few minutes' work and I will certainly appreciate it. If you have had any especially successful results in fertilizing in your county, I would especially appreciate a letter and photos. If suitable these will be published in BETTER CROPS at our regular rate of 1c. a word; $3 per photo. Thanks!

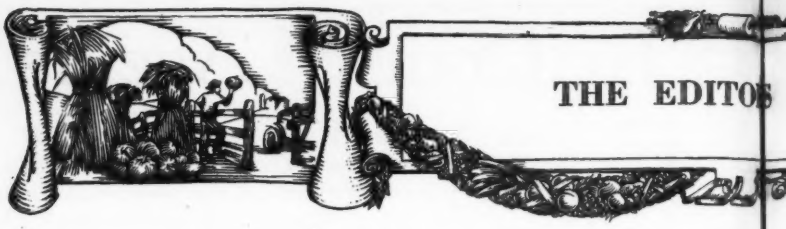
Jeff

Jeff McDermid, Better Crops Publishing Corp.,
81 Fulton Street, New York, N. Y.

1. What is the predominating soil in your county?.....
2. What are the chief crops in your county?.....
3. What are the most successful fertilizer formulas used in growing these crops?.....
4. What are your greatest troubles regarding fertilization?.....
.....
5. What remedies do you use?.....

Name.....County.....

City.....State.....



COOLIDGE'S MESSAGE

On Thursday, December 7th, 1923, Calvin Coolidge, Chief Magistrate of the United States, read before Congress his first message.

It was a strong message, written by a man who is not afraid to say what he thinks. That part of his message regarding agriculture is interesting. He said, "With his products not selling on a parity with the products of industry, every sound remedy that can be devised should be applied for the relief of the farmer. He represents a character, a type of citizenship, and a public necessity that must be preserved and afforded every facility for regaining prosperity."

One cannot mistake that message. It is clear as day. Coolidge goes on, "Cheaper fertilizers must be provided." Here we have a thought that is close to our hearts. All of us know that fundamental agricultural prosperity in these United States depends upon *permanent soil fertility*. In many sections of the country the soil is being robbed and mined of its plant food by short-sighted farmers who, because fertilizers seem high in price, have refused to use sufficient of them to replace the plant food removed by their crops.

There are two ways to overcome this situation. One is to secure cheaper fertilizers; and the other is to prove to the tiller of the soil that even were all fertilizers ten to twenty-five per cent. higher in cost than they now are, it would still be wisdom to apply plenty of chemical fertilizing salts. Farmers have been taught by Experiment Stations to carefully analyze the returns received from the application of fertilizers; they have been told that to apply five dollars' worth of fertilizer and increase the yield of the succeeding crop but four dollars' worth was poor business—better use less fertilizer. There is a fault in this reasoning that is quite apparent to the agronomist, but which is not apparent to the farmer. It is quite impossible to so accu-

rately gauge the needs of a forthcoming crop that precisely the right amount of each plant food can be drilled; a good guess must be made, based upon facts furnished by previous experiment.

Therefore, it is wise, in most instances to apply *more* fertilizer than the coming crop needs, even though the immediate increased yield does not make this heavier application profitable. Let the farmer once realize that the soil is a bank into which deposits may be safely made, even beyond withdrawals, and you have changed the complex of the situation and made permanent soil fertility a subject, not of nice balance and calculation, but of *investment.*

The farmer tries to accumulate in his bank more money than he has actual use for. He considers this the aim of his study and labor—to get ahead. Let him, then, consider his soil and its deposits in the same light, and you have removed the immediate necessity for cheaper fertilizers and have instilled into him a desire for permanent soil fertility—made of him an *investor*, instead of a robber and a miner. He will then be willing to put ten dollars' worth of fertilizer on his soil for every five dollars increased yield taken out, and the time will arrive when such deposits will be sufficient for many crops to come. The subject of "leaching" does not inhibit this program.

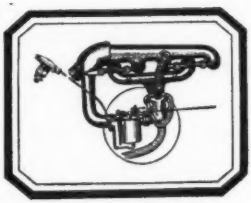
Cheaper fertilizers are needed, of course; and they will come as soon as freight rates are reduced, taxes cut, and more money is available for investment in productive industry. In the meantime, let us try to gain a new viewpoint on this subject and teach the farmer to become an investor in permanent soil fertility. In that program only lies our fundamental agricultural prosperity.

Yours to a cinder,

Jeff McDermid

Over 100,000 Stromberg Carburetors and Hot Spots Sold for Fords!

A Carburetor sales record never before equalled — and made possible only by the fact that the STROMBERG CARBURETOR and HOT SPOT for Fords delivers more mileage—more power—than any other Carburetor offered. It makes possible quicker getaway and much easier starting—four great essentials that every Ford owner is looking for.



Equip your Ford now—put on the new 1924 STROMBERG Model. Stop wasting gas—get more real enjoyment out of driving your Ford than you ever thought was possible.

More than 135 Passenger Car and Truck Manufacturers use Stromberg as standard equipment.

See your nearest dealer—if he doesn't carry the famous Stromberg Carburetor for Fords, write us direct for free literature and further information.

The Stromberg Motor Devices Co.

64 East 25th Street
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New STROMBERG CARBURETOR Does it!

Dear Jeff:

The evenings are getting longer, the work becomes easier and a farmer finds time to read, write and study a little.

I read with interest the story in your November BETTER CROPS about how the "Southern Soils Are Run Down in Productivity," and I think a story about how the Northwestern Soils Are Run Down in Productivity is a proper subject in BETTER CROPS.

To start in with, I am not a college teacher or graduate, just a plain old farmer and on the job all the time. I raise the grain and feed in summer and feed most of it in winter to cattle, horses and poultry—very busy summer and winter.

You have heard a good deal about the bad shape of the Northwest, and I wonder if you people know what ails us. Sometimes I wonder if we know it ourselves.

You hear talk about good farmers and poor farmers, but that name is not correct—*robbers* would be better and more fitting. Because that is what we are—robbers of our soil.

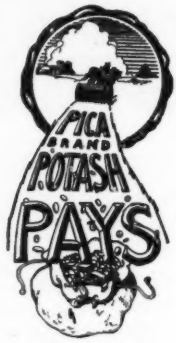
When we came here and others before us, we had wonderful soil, the finest, richest prairie soil to be gotten anywhere, and we cropped that soil. We plowed, sowed and always harvested, year in and year out. The soil was so full of plant food, humus, that we could raise anything abundantly and very cheap. The business shaped itself to our cheap grain, cattle, hogs, poultry, in fact anything that comes from the farm.

That robbing of our soil has been going on always, more or less, and the results are smaller yields. Besides, the ground gets full of foul seeds, such as pigeon-grass, mustard, wild oats, quack grass, cockle burrs, etc., and to a certain extent crop failures. We will have more of all that in the future, unless we "robbers" become "farmers," and in order to do so we must have the means to farm with, which we have not at present. More credit will not do, but we must have a profit on our work.

Cheaper money so that we can work to advantage, first of all.

There is no pleasure in raising crops, but the pleasure comes in raising your *own* crop. We cannot raise anything cheap any more, and the whole business world is shaped by our cheap products. Do you see where the shoe begins to pinch? We farmers are up against the whole business world (which wants to go on the old way), and we farmers are just now lying on our backs flat. This is the situation just now and not much hope in sight. We have overdrawn our bank account and the time to deposit some money is here. Our deposit lays back in the cattle yard, waiting for an active hand to haul it to the fields; active hands are hard to find and, besides, they don't like that dirty work, rather work in towns and cities. Consequently the fertility of our soil lies in heaps in the yards instead of in the fields.

Yours truly,
T. MULDER,
Altamont, Denel Co., S. Dakota.



Selling Fertility

With every crop the farmer sells, he also sells some of the fertility of his soil that helped to produce the crop.

Intelligent marketing of farm products is possible only when the seller takes into account the fertility he is selling and its replacement value.

Here, for example, is a list showing the number of pounds of potash per acre removed by the average yield of:

Grain and Hay in rotation..	75 lbs. potash
Oats	62 lbs. potash
Potatoes	74 lbs. potash
Sugar Beets	143 lbs. potash
Alfalfa Hay	168 lbs. potash
Green Corn	164 lbs. potash
Tobacco	200 lbs. potash

These losses must be replaced every year or poverty of the soil will rapidly follow.

A high percentage of Genuine German Potash Salts in mixed fertilizer is the most effective way of restoring the potash that has been withdrawn from the soil. Insist that mixed fertilizers used in your county contain Genuine German Potash and you can't go wrong. *Potash pays.*

POTASH IMPORTING CORPORATION of AMERICA

81 Fulton Street New York City.

The Winning Program

(*from page 27*)

one or more rotations."

1921

In 14 different communities a program of work was outlined in which some phase of soils work was incorporated. The people of the community elected a project leader and set a goal of work to be done. These ranged all the way from the growing of 50 acres of soybeans to the building of a limestone storage bin, depending upon the chief need of the community.

An analysis of the farm records for the year included a "Fertility Balance," which was worked out for each farm and compared with the average of the five best farms. Thus, the five best farmers had labor incomes of $1,094 compared to $551, the average of the labor incomes for the entire group. The five best farmers used more lime, more fertilizer, bought more concentrates, grew more legumes, and handled their manure better than did the average farmer.

1922

Following a conference of the community leaders, six "Fertilizer and Lime Schools" were held in various sections of the country. Five pasture improvement demonstrations were begun with a limestone and phosphate treatment, all planned and conducted almost wholly by the local community leaders.

Eight-hundred bushels of soybean seed were purchased cooperatively.

Fertilizer demonstrations were started on tomatoes and potatoes, which revealed the effectiveness of a 4-10-4 analysis. In one case, 800 pounds per acre of a 4-10-4 fertilizer produced an increased yield $63.89 greater than the cost of the fertilizer. On potatoes, 1,000 pounds of a 4-10-4 gave increased yields ranging from 36 to 90 bushels per acre.

1923

At a conference of community soils leaders in January, a county soils program was outlined, based on the community programs. It was also decided to stress pasture improvement work and "Fertilizer and Limestone Schools" during the year.

Thirteen additional pasture improvement demonstrations were begun in seven communities, their combined areas being about 75 acres. "Pasture Improvement Week" was observed, beginning June 11th.

Summarizing the work of six years, these things have been accomplished in Scioto County through Mr. Gahm's improvement program.

1—An organization of Community Soils leaders has been perfected. These leaders meet annually to consider problems and methods of solving them.

2—As a result of demonstrations, the use of limestone and fertilizer has been materially increased.

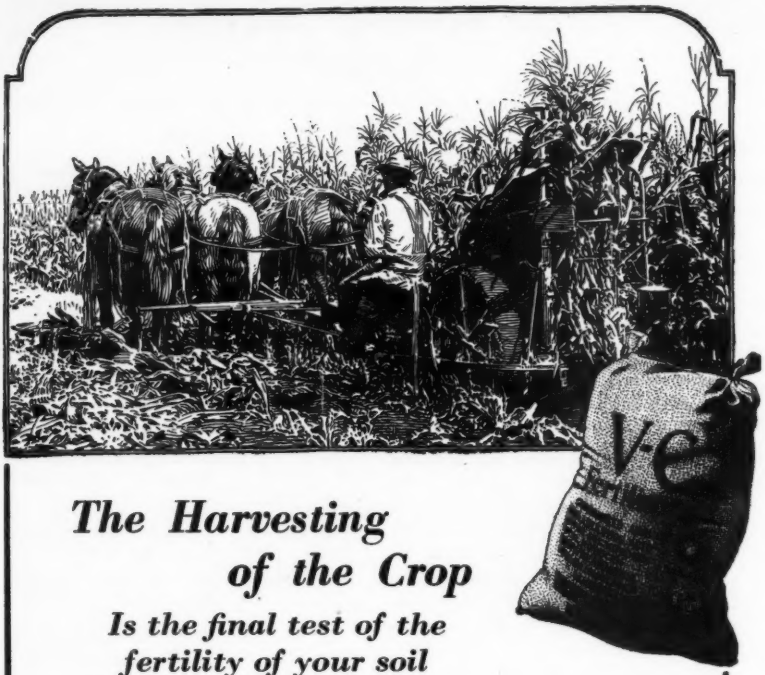
3—The acreage of legumes, particularly sweet clover and soybeans, has been much enlarged.

4—Many successful pasture rejuvenation demonstrations are under way.

5—Six permanent Community Demonstration Fields have been established.

6—A supply of limestone, available at all times, has been made possible by community cooperation in the building of a storage bin.

The people of Scioto County feel that this work is now only well begun—that the great benefits from it lie in the future. It is expected and planned that all work under way will continue to grow and expand to meet all needs that appear.



The Harvesting of the Crop

Is the final test of the fertility of your soil

One of the difficult problems you have in the growing of any crop is to determine the kind and amount of fertilizers to use for the most profitable yield.

Through our Agricultural Service Bureau, which is in touch with the fertilizer practice on the best farms from Maine to Texas, we are in the position to give our customers the benefit of our experience and observations as to the kind of fertilizers to use on your soil. Consult our Agricultural Service Bureau about your soil and crop problems. This service is free. Address

Agricultural Service Bureau

VIRGINIA-CAROLINA CHEMICAL COMPANY

Sales Offices

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Atlanta, Ga.
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Cocklebur Sprouts are Deadly

(*from page 28*)

Mr. Adams was much relieved to learn that the trouble was due to cocklebur poisoning, since he is a breeder, and the sale of his stock fell off alarmingly because his neighbors suspected cholera. The animals have not been allowed further access to young cocklebur sprouts and no more trouble has been experienced.

Considerable field work with cocklebur poisoning has been done by the Purdue Agricultural Extension Department, from which it seems that the trouble usually occurs when moist land dries in the spring. The drying of the land is followed by the simultaneous sprouting of millions of burs on well-infested land and it is then that poisoning develops, principally among swine and particularly in young animals. We are indebted to the experiments of Dwight, Roe and Clawson of the Bureau of Animal Industry for the knowledge that a quantity of cocklebur sprouts equal to one and one-half per cent. of the body weight of the animal is usually sufficient to prove fatal. From field experience, however, it is quite evident that degrees of susceptibility exist among animals in the same manner that some folks "take" poison ivy, while others do not.

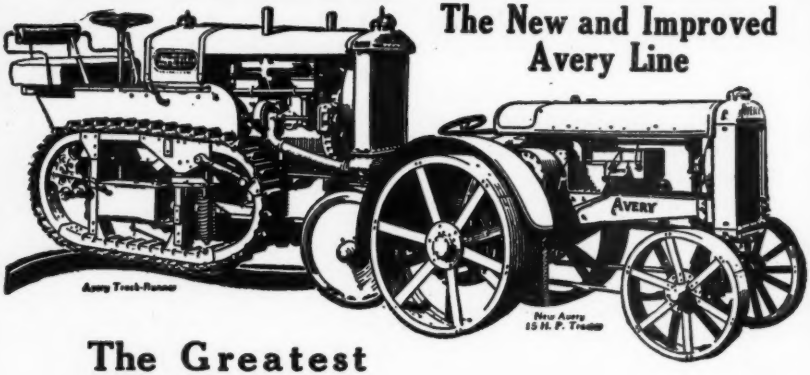
If you are in doubt as to whether or not cocklebur sprouts have been eaten, it might be worth while to post poisoned animals and examine the stomach contents. This was done by Walter Grelle, of Dillsboro, Indiana, who lost eight out of nine hogs the first day they were put in the pen last spring. He compared the plant parts found in the stomach with the sprouts growing in the pen, and although he did not recognize the juvenile stage of cocklebur, he sent the sprouts to Purdue for identification.

The remedy? Perfectly simple; don't allow animals to graze on cocklebur land until all the sprouts are at least four inches high and mow the weeds before new burs form. And doctor the sick animals by giving them liberal quantities of salted lard or grease of any kind. The fat, by coating the lining of the stomach, will do much to prevent the further absorption of the poison by the system, and the animal can be saved by this means if not too far gone. The poison, by the way, is probably a glucoside that has been given the imposing name xanthostrumarin.

New Facts in Orchard Spraying

(*from page 31*)

mix enough sulphur, lime, caseinate, and lead arsenate at one time to furnish material for the entire spraying. They then weigh out the amount required for each tank. This dry-mixed lime sulphur has been used with satisfactory results during the past season, in several states, and most progressive peach growers will be using it exclusively next year. It is cheap, easy to prepare and has proved effective. The secret of preparation is that the caseinate renders the sulphur wettable. The sulphur is the active ingredient in the control of brown rot, the most serious disease of the peach. The lime is used primarily to prevent injury to the foliage.



Avery Track-Runner

New Avery 15 H. P. Tractor

The New and Improved Avery Line

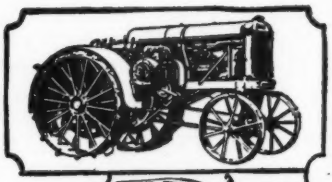
The Greatest Achievement in Tractor History

NEW models, many new improvements and refinements, greater power, more economy and lower prices—**the New Improved Avery Line** is really a sensation.

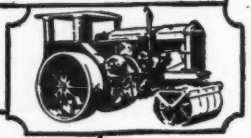
Never in tractor history have so many new improvements and desirable features been developed in one line. Avery machines now give better and more economical service and sell at lower prices.

The Avery Line for 1923 includes the Improved Avery Track-Runner that runs on a roller-bearing track; the NEW Avery 15 H. P. enclosed gear, 3-plow wheel tractor, with two bearing belt transmission and two gear contact drawbar transmission; the Improved "Road-Razer" for shaving unpaved roads and streets smooth in summer and removing snow in winter; the Improved Avery Tractors for farming, threshing and road-building in the 20-35, 25-50 and 45-65 H. P. sizes; also grain-saving threshers in all sizes, motor cultivators, tractor plows, tillage tools and other drawbar and belt machinery.

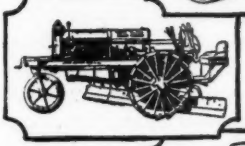
Get the latest prices on Avery Tractors which now give you more horse-power per dollar than ever before offered.



Improved Avery 20-35 H. P. Tractor. Also built in 25-50 and 45-65 H. P. sizes

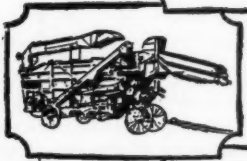


Improved Avery 25-50 H. P. 10-Ton Road-Roller-Tractor. Also built in 45-65 H. P. size

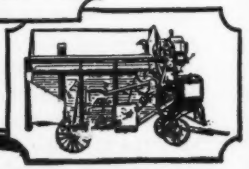


Avery "Road-Razer"

Avery Motor Truck



Avery Grain-Saver Thresher. Built in "Yellow-Baby," "Yellow-Kid" and "Yellow-Fellow" sizes.



Avery Header Thresher. Harvests and threshes the grain in one operation.

"It pays to Avery-ize"

Avery Co.

Factory and Main Office **Peoria, Ill.**

Branch Houses, Distributors and Service Stations covering every State in the Union.

AVERY

Tractors, Trucks, Motor Cultivators Threshers, Plows, etc.

How the California Almond Growers' Exchange Achieved Success Through Cooperation

(*from page 25*)

reflected in increased banking credit so necessary for financing the marketing operations of the Exchange. On the 1922 crop the Exchange was enabled to advance a higher percentage of the market value of the crop than ever before, owing to the increased confidence created and the stability of the loans which were necessary to make the advances. There had been much opposition to the lien clause on the part of the growers solicited to sign it, but this was wiped away in the general approval of the larger advances it made possible.

This brings us to the method of operation of the Exchange, but it is worth while to revert for a moment to the phase of the reorganization campaign, involving the opposition to the lien clause in the contract. The belief was propagated by enemies of cooperation that the lien clause, following as it did the land, would deter sales and transfers of almond orchard property. This argument was wholly fallacious, as later experience proved. In cases of bonafide sales, where it was necessary to release the grower from his contract to effect sale, the Board of Directors very early adopted a liberal policy. Likewise they relinquished priority of lien on 24 hours' notice to banks from whom growers had asked loans on the property under contract. In short, the lien clause, while it insures delivery of the crop to the association, operates in no way as a barrier to ready transfers of land or to quick loans on growers' properties.

Now, further, as to the operation of the association. The grower is a member directly of the Exchange and accounts are settled with him individually. He has a direct vote in the election of the enlarged Board of Directors on a tonnage basis. Local associations still exist and are still members.

The Exchange, through the local associations, operates some 14 warehouses and processing plants to handle the almond crops marketed by the Exchange. With the exception of a central plant at Sacramento, California, these warehouses and plants are owned cooperatively by various local associations.

The Exchange exercises a general supervision over the conduct and operation of these warehouses and dictates standards of grading and the methods employed, although the warehouse forces are hired and paid by the local association except where local associations prefer to have the Exchange render this service. If, however, a warehouseman is not suitable to the Exchange he is replaced.

Members deliver their crops to the local warehouses or, at their option, to the central plant at Sacramento. These deliveries are receipted for and copies of the receipts are cleared each night to headquarters at San Francisco and a check covering advance payments at figures previously fixed by the Board of Directors per variety goes forward to the grower directly in the next day's mail. The Exchange, from these receipts, compiles a list of stock by varieties in each warehouse and orders cars out against these delivery reports. The almonds are bleached in warehouses and resacked. In no case is a grower allowed to do his own processing and bleaching. This assures uniform color.

Neither is a grower permitted to grade. All grading is done by experts in the warehouse and delivery receipts show the grades assigned. Grading standards have been raised above what they have been in the past. Grading is on the basis of size within each variety, save in the case of wormy or stained nuts which, of course, are classed as such.

The Exchange opens its books for orders on "subject to price approval" basis the latter part of January or the first of February for the crop of that calendar year. These orders are obtained through jobbers, food commodity (*turn to page 48*)

Genuine German Potash Salts

can be secured from any of the following distributors:

ALABAMA

Birmingham—
Grasselli Chemical Co.
Virginia-Carolina Chemical Co.
Montgomery—
American Agricultural Chem. Co.
Armour Fertilizer Works
Capital Fertilizer Co.
International Agricultural Corp.
F. S. Royster Guano Co.
Virginia-Carolina Chemical Co.

ARKANSAS

Little Rock—
Arkansas Fertilizer Co.

CALIFORNIA

Azusa—
Geo. W. Fuhr
Covina—
Sun Fertilizer Co.
Glendora—
Frahm & Manning
Los Angeles—
Agricultural Chemical Works
American Agricultural Chem. Co.
Hauser Packing Co.
Mutual Orange Distributors
Southern California Fertilizer Co.
Spreckels Bros. Comm. Co.
Western Meat Co.
San Francisco—
A. M. Bloomer Co.
California Fertilizer Works
Getz Bros. & Co.
Growers' Fertilizer Co.
Meyer Wilson & Co.
Mountain Copper Co., Ltd., Fert. Dept.
Pacific Bone, Coal & Fert. Co.
Pacific Guano & Fertilizer Co.
Western Meat Co.

CONNECTICUT

Bridgeport—
Berkshire Fertilizer Co.
Hartford—
Olds & Whipple, Inc.
Middletown—
Rogers & Hubbard Co.
New Haven—
American Agricultural Chem. Co.

FLORIDA

Bernandina—
Nitrate Agencies Co.
Bradentown—
Gulf Fertilizer Co.
Clearwater—
Gulf Fertilizer Co.
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Jacksonville—
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Armour Fertilizer Works
International Agricultural Corp.
Nitrate Agencies Co.
Virginia-Carolina Chemical Co.
Wilson Toomer Fertilizer Co.
Lake Hamilton—
Gulf Fertilizer Co.
Orlando—
Gulf Fertilizer Co.
Tampa—
Gulf Fertilizer Co.
Terra Ceia—
Gulf Fertilizer Co.
Winter Haven—
Gulf Fertilizer Co.

GEORGIA

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Virginia-Carolina Chemical Co.
Athens—
Empire State Chemical Co.
Georgia Phosphate Co.
Hodgson Cotton Co.
Atlanta—
A. D. Adair & McCarthy Bros. Co.
American Agricultural Chem. Co.
Armour Fert. Wks. (So. Hdqrs.)
International Agricultural Corp.
F. S. Royster Guano Co.
Virginia-Carolina Chemical Co.
Augusta—
Southern State Phosphate & Fertilizer Co.
Virginia-Carolina Chemical Co.
Baxley—
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Macon—
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Pelham Phosphate Co.
Savannah—
American Agricultural Chem. Co.
Mutual Fertilizer Co.
Read Phosphate Co.
Reliance Fertilizer Co.
Savannah Guano Co.
Southern Fertilizer Co.
Virginia-Carolina Chemical Co.
Valdosta—
Georgia Fertilizer & Oil Co.
Vidalia—
Vidalia Chemical Co.

ILLINOIS

Chicago—
Armour Fertilizer Works
Darling & Company
Swift & Company

INDIANA

Indianapolis—
Rauh & Sons Fertilizer Co.
Smith Agricultural Co.
New Albany—
Calumet Fertilizer Co.
Read Phosphate Co.

(Continued on next page)

(Continued from preceding page)

KENTUCKY

Louisville—
Armour Fertilizer Works
Federal Chemical Co.

LOUISIANA

New Orleans—
Armour Fertilizer Works
Nitrate Agencies Co.
Shreveport—
Virginia-Carolina Chemical Co.

MAINE

Houlton—
International Agricultural Corp.

MARYLAND

Baltimore—
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F. S. Royster Guano Co.
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Salisbury—
Tilghman Company, Inc., W.B.

MASSACHUSETTS

Boston—
American Agricultural Chem. Co.

MICHIGAN

Detroit—
American Agricultural Chem. Co.

MISSISSIPPI

Jackson—
Virginia-Carolina Chemical Co.
Meridian—
Meridian Fertilizer Factory
Tupelo—
Tupelo Fertilizer Factory

MISSOURI

St. Louis—
American Agricultural Chem. Co.
Armour Fertilizer Works

NEW JERSEY

Bound Brook—
Nitrate Agencies Co.

NEW YORK

Buffalo—
American Agricultural Chem. Co.
International Agricultural Corp.
New York—
American Agricultural Chem. Co.
Armour Fert. Wks. (East. Hdqrs.)
International Agricultural Corp.
Mutual Fertilizer Co.
National Aniline & Chemical Co.
Nitrate Agencies Co.
Virginia-Carolina Chemical Co.
Zaldo & Martines Exchange Co.

NORTH CAROLINA

Charlotte—
International Agricultural Corp.
F. S. Royster Guano Co.
Durham—
Virginia-Carolina Chemical Co.
Greensboro—
American Agricultural Chem. Co.
Armour Fertilizer Works
Henderson—
American Agricultural Chem. Co.
Lillington—
Farmers Cotton Oil Co.
Harnett Oil & Fertilizer Co.
Raleigh—
F. S. Royster Guano Co.
Tarboro—
F. S. Royster Guano Co.
Washington—
Pamlico Chemical Co.
Wilmington—
Acme Manufacturing Co.
Nitrate Agencies Co.
Virginia-Carolina Chemical Co.
Wilson—
Farmers Cotton Oil Co.
Winston-Salem—
Virginia-Carolina Chemical Co.

OHIO

Cincinnati—
American Agricultural Chem. Co.
Armour Fertilizer Works
International Agricultural Corp.
Virginia-Carolina Chemical Co.
Columbus—
Smith Agricultural Co.
Dayton—
Wuichet Fertilizer Co.
Sandusky—
Armour Fertilizer Works
Toledo—
F. S. Royster Guano Co.

OREGON

No. Portland—
Swift & Co.
Portland—
C. C. Cate & Co.
Portland State Co.

PENNSYLVANIA

Philadelphia—
Baugh & Son
I. P. Thomas & Son
Tunnel & Company
Reading—
Keystone Bone Fertilizer Co.
Wadsworth—
Ohio Match Co.
York—
York Chemical Co.

SOUTH CAROLINA

Anderson—
Anderson Phosphate & Oil Co.
Charleston—
American Agricultural Chem. Co.
Etiwan Fertilizer Co.
Maybank Fertilizer Co.
Planters Fert. & Phosphate Co.
Read Phosphate Co.
Virginia-Carolina Chemical Co.
Columbia—
American Agricultural Chem. Co.
Darlington Guano Co.
F. S. Royster Guano Co.
Virginia-Carolina Chemical Co.
Greenwood—
T. M. Miller Co.
North—
J. E. Culler Co.

(Continued on next page)

(*Continued from preceding page*)

Spartanburg—
American Agricultural Chem. Co.

TENNESSEE

Memphis—
Virginia-Carolina Chemical Co.
Nashville—
Read Phosphate Co.
Virginia-Carolina Chemical Co.

VIRGINIA

Alexandria—
American Agricultural Chem. Co.
Lynchburg—
Pocahontas Guano Co.
Nashville—
American Agricultural Chem. Co.
Read Phosphate Co.
Virginia-Carolina Chemical Co.
Norfolk—
American Agricultural Chem. Co.
Baugh & Sons Co.
Farmers Guano Co.
International Agricultural Corp.
Priddy & Co.
Robertson Chemical Co.
Virginia-Carolina Chemical Co.
Richmond—
Old Buck Guano Co.
Virginia-Carolina Chemical Co.

WASHINGTON

Seattle—
Balfour, Guthrie & Co.
Chas. H. Lilly Co.
Tacoma—
Stock & Plant Food Co.
Marine Products Co.

CANADA

British Columbia

New Westminster—
Triangle Chemical Co., Ltd.
Vancouver—
Canadian Explosives, Ltd.
Victoria Chemical Co., Ltd.

Quebec

Montreal—
Arthur Lavigeur, Ltd.
Quebec—
George Tanquay, Ltd.

New Brunswick

Bath—
C. E. Gallagher Co.
Hartland—
Hatfield & Co., Ltd.
Home Mixed Fertilizers, Ltd.
St. Stephen—
Dominion Fertilizer Co.

Nova Scotia

Wolfeville—
T. L. Harvey Co.

Ontario

West Toronto—
Gunns, Ltd.
National Fertilizers, Ltd.

Prince Edward Island

Montague—
Poole & Thompson, Ltd.

THE POTASH IMPORTING CORPORATION OF AMERICA

81 Fulton Street **New York**

Almond Growers

(*from page 45*)

brokers and through a corps of salesmen employed by the Exchange who are constantly on the road. The buyer's order is taken on a subject to price approval basis, which means that, when prices are named that are not satisfactory to him, the buyer has the right to cancel his contract. On the other hand, if he confirms his contract in full when prices are named, he will obtain the advantage of one cent per pound discount from the opening prices, according to variety.

Harvesting of the earlier varieties generally begins about August 15 and continues through into October. The financing of the movement of the crop is arranged sometime prior to harvest. Bank loans for the movement of the crop run as high as two and one-half million dollars and are retired as the proceeds of sales are returned. Not only are the market operations of the Exchange financed through these bank loans, but they also provide funds for advances to the grower upon delivery of his crop. The Board of Directors have full power to contract such debts as are necessary in the interest of the business. This blanket power has worked to the best interest of the Association at all times, as it allows the directors complete freedom to meet emergencies. It has never been abused.

The crop is gathered into state pools according to variety. In these pools are lost the individual deliveries of all members. However, true to the fundamental principles of cooperation, the Exchange does not dump upon the market that part of its tonnage which it may find itself unable to sell. On the (*see next page*)

An Open Letter

(*from page 22*)

turers and distributors to be seeking one another's scalp for the comparatively few tons of potash we are now producing and distributing. The destiny of the potash industry is not to preach cramped supplies but greater and still greater consumption.

Our efforts should be expended in constructive work—in inducing our farmers to cease impoverishing the plant food deposits of our land, and to put back on the land some of the wealth withdrawn by our crops. To show them these redeposits in their overdrawn land account are for their own profit and for the conservation of the food supply of unborn generations.

A plentiful and cheap supply of fertilizer is what this country needs to enable the growing of large crops and the production of abundant food supplies at lowest possible costs, with the greatest profit to the farmer. This ideal can be reached only by maximum crops per acre cultivated per man employed, and the answer to that riddle is cheaper and more fertilizers.

The question of paramount importance to these United States and especially to California is not whether a few manufacturers of a small fraction of an essential fertilizer product shall prosper by an artificial increase in prices, but whether the people in general and farmers in particular shall have the possibility of obtaining its foods cheaply and profitably and whether they can afford to assure the future prosperity of our country by putting back into our soils the plant foods which our crops are continuously draining.

A cheap and plentiful supply of potash is a prime necessity to this end.

The test of the worthiness of any industry, like that of an individual, and its justification for support from civilization is what it contributes to the progress of the world. Does it return to mankind an equivalent for what it has received? Or is its end solely that of self enrichment? The potash industry must be judged by these standards if it is to serve the high purpose for which it was intended. It must make potash available in unlimited quantities for every farm in these United States at a price that will make possible the profitable production of cheap food for the feeding of our people.

Very truly yours,

E. K. HOWE.

Almond Growers

(*from preceding page*)

contrary, it prefers to carry over any surplus stock it may have in order to protect the market. Its protection of the market goes further than this as the Association guarantees its opening prices against decline until January first, the end of the active almond market. The Exchange has always followed this policy of market protection, preferring to pay the cost of storage on the unsold product and delay payment to its members, rather than give its product away at sacrifice prices and thus jeopardize standards of value from year to year.

It has been a steep and rocky road that the Exchange has traveled. The journey has not been finished and probably never will be, as cooperation rests with the human element and the human element will never be perfect. The California Almond Growers' Exchange or any cooperative must operate upon sound business principles, principles as secure and as tested as the business formulæ employed in private enterprise. Whenever cooperation deviates from these principles, it is bound to fail.

The Protection That Potash Gives

POTASH is known to be an essential plant food. Without it, growth is impossible.

In addition to supplying a vital element of nourishment, potash has a tonic effect that keeps the plant in a healthy condition. It is a demonstrated fact that crops well supplied with potash are better able to ward off fungus and other diseases.

Full rations of potash overcome the effect of nematodes on beets and other root crops. German Crude Potash Salts drilled in at the time of seeding protect against cutworms and root lice.

Fruit and vegetables generously fed with potash stand shipping better and keep in marketable condition longer. Potash aids plants to resist low temperatures and light frost.

These are a few of the ways in which potash gives *health-protection* to crops. It is one of the reasons why *Potash Pays.*

For best results, be sure that Genuine German Potash is used, as imported direct by

POTASH IMPORTING CORPORATION OF AMERICA

81 Fulton Street ***New York City***

PICA GENUINE GERMAN POTASH

(NOTE: Name given is of county unless otherwise noted.)

For several weeks past, the movement of paper shell pecans has been heavy—marketing through two corporations—National Pecan Exchange and Southern Pecan Growers' Corp. Ass'n.—and through local dealers. Estimated receipts at Albany, 2,000,000 pounds.—*J. Irwin Davis, Sougherty, Ga.*

We have the largest acreage of new alfalfa this fall that we have ever had. Plenty of moisture at seeding time has made an excellent stand and growth and it looks favorable for going into the winter. Alfalfa is the wonder crop on our sand land in this county.—*T. R. Isaacs, Mason, Ill.*

We have bought ten carloads of Nitrate of Soda cooperatively through the Farm Bureau, eight in excess of amount purchased last year. Have also purchased three carloads of Calcium Arsenate from the same source for use in fighting boll weevil and army worms on next year's crop. Saving on these two cooperative purchases will pay Agent's salary for eight years.—*R. H. Benton, Franklin, La.*

The Georgia Experiment Station has just issued a bulletin on the Pineapple pear, the pear that has been proven to be blight resistant. The pear has been grown by individuals in various places in the south for over fifty years, but the originator cannot be placed, from the closest investigations.

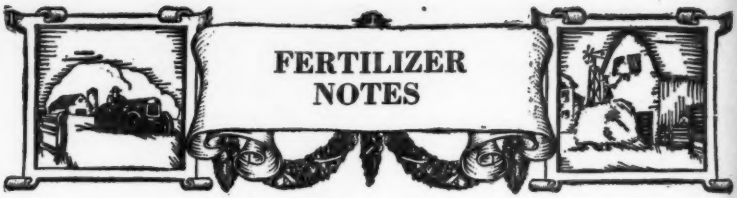
This bulletin is for free distribution.—*J. G. Woodroof, Asst. Hort., Ga.*

The Cooperative Pure Milk Association of Cincinnati, which controls around 70 per cent. of the milk produced in that territory, has just completed purchase of the French Bros.-Bauer dairy interests of Cincinnati. This gives the milk producers' organization an outlet for all of its milk through its own distributing organization and makes it the second largest industrial organization in Cincinnati and the second largest cooperative milk distributing organization in the U. S.—*Walter D. Hunnicutt, Butler, Ohio.*

Cotton, a new crop for this section, looks like a "good bet," expect several thousand acres to be planted in 1924, almost no wheat planted. This has been one year that string beans have hit the "Bull's-eye." Weather fine—very few frosts—corn too damp to crib. Hens resting. No one wants to work on farms as wages are not satisfactory. Gas 14c.—eggs 50.—*H. L. Spaulding, Pulaski County, Ill.*

Just received reports from 10 demonstrators of Yellow Sweet Clover as a pasture crop on dry land. The average acre pastured 10 hogs for 3 months and 9 days and 1 cow for 3 months and 7 days. Seven recommended planting 5 pounds of seed per acre. Five recommended planting oats or barley as a nurse crop to give shade to the young plants. The clover grew 3 inches higher when shaded by Russian thistles.—*S. L. Owens, Huerfane, Colorado.*

Collections are improving. Citrus crops are particularly promising. Fertilizer sales increased 18 per cent. over same period last year. Tourists (our money crop), arriving in greater numbers.—*R. R. Rogers, Duval, Fla.*



Potash Hunger in Tobacco Crops

Field tests conducted on "tobacco-sick" soils in the Connecticut Valley have brought out marked differences in the effects of various crops on the growth of tobacco following in the rotation. The effects of timothy sod, red clover, and corn have been particularly unfavorable, while the growth of tobacco has been much better after onions, after tobacco itself, and on land kept free from vegetation during the previous season.

Field tests in the Southern manufacturing and export-tobacco districts have demonstrated that mixed fertilizers containing 2 to 3 per cent. of potash applied at the usual rate of 800 to 1,000 pounds per acre frequently do not supply sufficient potash for the tobacco crop. As a result characteristic symptoms of potash hunger frequently develop. When the application of potash is increased to 40 pounds or more per acre, these symptoms do not occur, there is a notable increase in resistance to leaf-spot diseases, and the leaf is otherwise improved in quality and in yield.

On light soils, and especially in comparatively wet years, "Sand Drown," a serious deterioration of the tobacco crop, may be expected when a sufficient quantity of magnesia is not contained in the fertilizer or otherwise added to the soil. The quantity of magnesia required by the crop, however, is comparatively small, perhaps not more than half that of the potash which is needed.

Both potash deficiency and magnesia deficiency present characteristic symptoms which are easily recognized, and both are readily corrected by suitable applications of fertilizer. With constantly decreasing supplies of cottonseed meal and other similar materials containing appreciable quantities of magnesia, it is apparent that there will be greater necessity for making special provision for magnesia in the fertilizer mixture.—*Report of Wm. A. Taylor, Chief of the Bureau of Plant Industry.*

Feeds, Fertilizers and Lime Worth $50,000,000

The Bureau of Chemistry of the Pennsylvania Department of Agriculture, one of whose duties is to see that all feeds, fertilizers and agricultural limes sold in the state are properly registered and correctly guaranteed and labeled, annually protects Pennsylvania farmers in the purchase of $50,000,000 worth of these materials.

State Chemist James W. Kellogg estimates that every year one million tons of feeding stuffs, 325,000 tons of fertilizers and 300,000 tons of agricultural lime are sold within the state. The feeds are valued at $40,000,000, the fertilizers at $11,000,000 and the lime at $1,500,000.

The chemical analysis of all the products sampled by the bureau in a year requires over 12,000 single determinations, each of which must be carefully and accurately made. Through these analyses the chemists determine which brands are deficient and which are giving full value for the purchase price.

Plowing at the rate of 6 to 10 acres a day, Cletracs make quick work of the biggest fields

Bigger Profits for the Farmer

Not only do Cletracs enable farmers to plow many acres in a day, but they also make every acre turned over produce more, and greater yields mean bigger profits to the farmer.

A Better Seed Bed Insures a Bigger Crop

But Cletracs do more than simply a good job of plowing. They are admirably suited for ground fitting because of their crawler construction. The broad tracks carry Cletracs along over the plowed land without slip at full speed, mellowing the ground into a fine seed bed, but do not pack it down. A well-preserved seed bed is the farmer's best assurance of a bigger yield and a better crop.

A big modern factory with upwards of five acres of floor space under roof and thirty thousand Cletracs in use in the United States, Canada and seventy foreign countries are time-tested evidences of Cletrac's successful operation.

THE CLEVELAND TRACTOR COMPANY

CLEVELAND, OHIO

Half fed cows yield
half full pails
WHEN the meadow or pasture land is scanty the udders are scanty. Cows cannot make milk from succulent grass unless they must have food.
Now cows are practically helpless and it is hungry for plant-food.
Three elements are essential to plant growth. These three should be present in the soil if you are to obtain maximum growth. These three are nitrogen, phosphoric acid and potash. If any of these is absent from the soil you will not reap your yield. If any is short your crops will be light. If any is all your crops will not repay your effort in preparing your land for your seed, cultivating and harvesting.
All crops remove potash
No doubt that grower can recall well-kept fields of corn that removed 170 pounds of potash from every acre when at harvest time. Or grower can recall fields of wheat or oats that removed 35 pounds of potash with every crop of corn.
To be successful you must replace the potash that has been removed from the land. Otherwise you are a mere miner and not a farmer. Potash will become a real limiting factor in your land and your farming. Your land will be "starved out."
Bigger yields, bigger profits
Bigger yields mean bigger profits. Used one way or another, potash will always pay for itself many times over. Potash makes better crops, more valuable crops. Potash makes crops more profitable. Potash makes crops more resistant to drought. Potash makes crops more resistant to disease. Potash makes crops more resistant to insects. Potash makes crops better keepers. Potash makes crops better shippers. Potash makes crops better sellers. Potash makes crops better in the can. Potash makes crops better in the dish.
The POTASH IMPORTING CORPORATION OF AMERICA, 81 FULTON ST., NEW YORK
POTASH PAYS
Genuine German
POTASH

Two advertisements — and

THESE two advertisements will appear, during December and January, in a list of farm papers read by over a million farm families in the fertilizer-consuming sections.

What do these messages mean to you? This: we are helping you spread the gospel of increased soil-fertility. We are assisting you in your efforts to get more and better fertilizers used in your county and state. We are doing our part to popularize high-analysis fertilizers, and particularly high-analysis as pertains to potash.

You know that the fertilizers used during the

THE POTASH IMPORTING

Importers of Genuine German Potash of the German Kali Syndicate

The bottom of the barrel—
THERE was an old lady who took only a spoonful or two of flour from a barrel each day and noticed that the bottom was still far away. She exclaimed, "Why this barrel of flour will last forever." But the bottom finally came. In four soil there are three plant foods—nitrogen, phospho-rous and potash. Every crop you grow takes its toll of each. You replace three elements of these three elements by rotating your crops, and food by growing manure. But do you return all the potash that is removed? If you do not, there will come a day when the bottom of the barrel will be reached.
Manure alone will not do it. You must add potash to your mixed fertilizer, or buy mixed fertilizer that contains plenty of potash.
The use of potash is profitable. Potash pays.
If you buy mixed fertilizer insist on a formula that is high in potash. Your dealer can supply the German potash in mixed fertilizers.
Genuine German POTASH
POTASH IMPORTING CORPORATION OF AMERICA
81 FULTON ST. NEW YORK.

what they mean to you

last four or five years in your community have been deficient in potash—they have not contained enough of this essential plant food. Until this situation is remedied no crop in your section will attain its full potentialities.

Readers of farm papers are going to ask your opinion of potash. We ask you to help us as we are helping you. Tell your farmers to use plenty of potash, and convince them that the best way to add available potash is to use Genuine German Potash, either in the form of potash salts or in the form of mixed fertilizers that contain a high potash-unit.

CORPORATION OF AMERICA
81 Fulton Street
New York City
New York

Table giving the amounts of fertilizer ingredients (Potash, Phosphoric Acid and Nitrogen) contained in the crop from one acre

CROP	Yield	Straw, etc.	Potash	Phos. Acid	Nitrogen
Alfalfa hay	4 tons	.....	168 lbs.	40 lbs.	196 lbs.
Apples	.....	.....	55 "	14 "	52 "
Barley	30 bu.	2,000 lbs.	51 "	17 "	57 "
Beans	30 "	2,700 "	53 "	30 "	75 "
Buckwheat	34 "	2,800 "	40 "	14 "	56 "
Cabbage	30 tons	.....	270 "	70 "	200 "
Clover (Alsike)	2 "	.....	50 "	20 "	84 "
Clover (Crimson)	2 "	.....	60 "	18 "	84 "
Clover (Dry)	2 "	.....	88 "	18 "	82 "
Clover (Green)	15 "	.....	140 "	40 "	130 "
Clover (Mammoth)	2 "	.....	48 "	22 "	88 "
Clover (Sweet)	2 "	.....	74 "	22 "	80 "
Clover (White)	2 "	.....	50 "	20 "	90 "
Cow Pea Hay	2 "	.....	70 "	22 "	100 "
Cow Pea Seed	20 bu.	.....	15 "	12 "	37 "
Corn	70 "	5,000 lbs.	100 "	42 "	105 "
Seed Cotton	1,500 lbs.	3,000 "	61 "	38 "	97 "
Grapes	2 tons	7,000 "	39 "	11 "	32 "
Hops	600 lbs.	2,700 "	53 "	23 "	84 "
Mixed Hay	5,000 "	.....	77 "	18 "	70 "
Oats	60 bu.	3,200 lbs.	62 "	22 "	55 "
Onions	45,000 lbs.	.....	72 "	37 "	72 "
Peaches	.....	.....	72 "	18 "	75 "
Pears	.....	.....	33 "	7 "	30 "
Peas	30 bu.	3,000 lbs.	52 "	33 "	108 "
Plums	.....	.....	38 "	9 "	30 "
Potatoes	200 bu.	1 500 lbs.	74 "	21 "	46 "
Rice (Rough)	2,000 lbs.	4,000 "	20 "	16 "	53 "
Rye	30 bu.	4,250 "	45 "	26 "	51 "
Serradella Hay	2 tons	.....	80 "	30 "	96 "
Soybean	20 bu.	2,000 lbs.	54 "	36 "	100 "
Soybean Seed	20 "	.....	24 "	22 "	64 "
Sugar Beets	15 tons	6,000 lbs.	143 "	32 "	69 "
Sugar Cane	30 "	18 tons	100 "	55 "	80 "
Timothy Hay	4,000 lbs.	.....	94 "	23 "	89 "
Tobacco	1,600 "	1,400 lbs.	200 "	16 "	76 "
Tomatoes	10 tons	.....	54 "	20 "	32 "
Turnips	700 bu.	5 tons	180 "	52 "	80 "
Vetch Hay	2 tons	.....	92 "	30 "	112 "
Wheat	35 bu.	3,000 lbs.	31 "	24 "	59 "

Profitable Fertilization

(*from page 15*)

usefulness of green manuring with legumes and the failure with non-legumes, that is, plants that do not have the power of drawing nitrogen from the atmosphere.

As has been shown by the illustrations, crops like buckwheat and mustard are not adapted for green manuring, but farmers sometimes raise these crops in the fall, manuring them with nitrogen fertilizers, so as to get a good growth, and plow them under in the spring. Many experiments and practical experience show that this method of green manuring is not advisable or economical. The reason is that the nitrogen in its usually soluble form, as applied in nitrate of soda, changes into less soluble organic compounds, which are not so readily available as plant food for the succeeding crop.

In the illustrations so far presented, the reader will notice that in each case the pots have been supplied with potash and phosphoric acid, because no plant can make its growth without these two substances. Furthermore, in order that leguminous plants may accumulate their fertilizer nitrogen, it is necessary that potash and phosphoric acid be applied first, or at any rate be present in the soil in available forms and in ample quantities. Many soils contain considerable quantities of potash and phosphoric acid, but as they are in such an insoluble state, they cannot be absorbed by the growing crop and are, therefore, of little value.

The need of potash and phosphoric acid is well illustrated in another experiment. The pots shown in the upper half of illustration Figure 4 were planted to peas, and are divided into three sets of two pots each. They were treated as follows: First two, no fertilizers; second two, potash and phosphoric acid; third two, potash, phosphoric acid and nitrogen. The three sets are marked by "O"—no fertilizer, "KP"—potash and phosphoric acid, and "KPN"—potash, phosphoric acid and nitrogen. The growth shows that potash-phosphate manuring was practically as effective as when nitrogen was added, and that the use of nitrogen fertilizers in this case was a needless expense.

The lower half of this illustration shows pots treated exactly the same way, but planted to oats, a non-legume. As the picture shows, the potash-phosphate pots are scarcely better than those not manured; but the pots treated with nitrogen, in addition to potash and phosphoric acid, made an excellent growth. In other words, the peas secured practically all the nitrogen they needed, but the oats have not this power, and unless they are given the fertilizer nitrogen, they will fail to make profitable growth. It is scarcely necessary to remark that the results would have been similar had the legumes, instead of peas, been any of the clovers, vetches, lupines, soja beans, etc.

From the data already given, two important conclusions were established:

1. Sufficient potash and phosphoric acid must be supplied in order that leguminous plants may be able to draw a full supply of free nitrogen from the air and thus reach their full growth.

2. In order that grain and all other farm crops may utilize the

nitrogen present in the soil, it is necessary that a sufficient quantity of potash and phosphoric acid be also present in the soil.

A very striking practical illustration of successful green manuring is in meadows of mixed grasses. Among the grasses in meadows will be found more or less of clovers and other legumes, and if a meadow be fertilized with potash and phosphoric acid, these leguminous plants will show a more vigorous growth and condition.

The grasses of such meadows will also show the beneficial effect of this treatment. The first year or two they may not seem to do much better than before. That is because they were not supplied with sufficient nitrogen. But in the third and fourth years, the grasses begin to thrive and run rank, because they feed upon the nitrogen supplied to the soil by the decaying leaves, stalks and roots of the legumes, the growth of which was promoted by the use of potash and phosphoric acid.

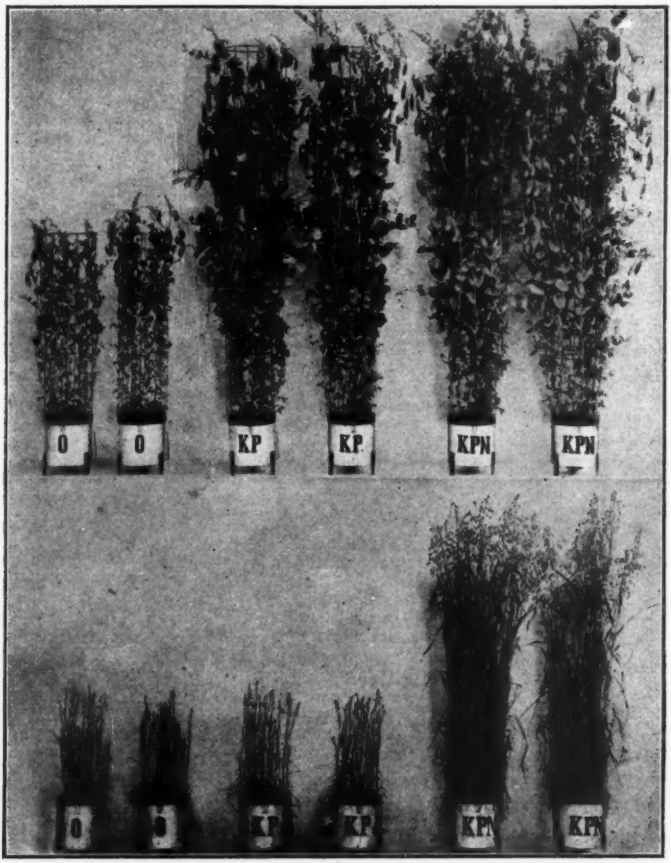


Fig. 4. Showing effect of potash-phosphate manuring on legumes (above) and non-legumes (below).

Every farmer should practise potash-phosphate fertilization on poor meadow fields. It is thus possible to transform an unprofitable "grass meadow" into a valuable "clover meadow." By repeated and heavy applications of potash and phosphoric acid, the very appearance of a neglected meadow, which has produced only sour grasses, can be entirely changed, owing to the predominance and rank development of clovers and other legumes.

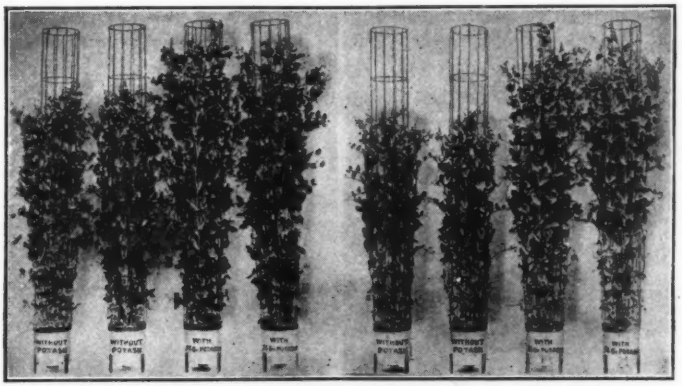


Fig. 5. The potash in soils is of no value, unless available.

To sum up: It is necessary to supply liberal amounts of potash and phosphoric acid to the soil in order that the costly nitrogen present, or applied in the form of fertilizers, or in the form of green manuring, may exert its full effect upon the growing plants and thus produce a maximum crop.

All farmers should know, by this time, that what is commonly called "plant food," comprises three ingredients: Potash, phosphoric acid and nitrogen. Large quantities of these plant food elements are usually present in agricultural soils, most of which, however, is in an insoluble (unavailable) condition, and, therefore, useless to growing plants. Thus soils may contain, as shown by chemical analysis, large supplies of plant food and still fail for the lack of it. This is shown by an experiment illustrated in Figure 5.

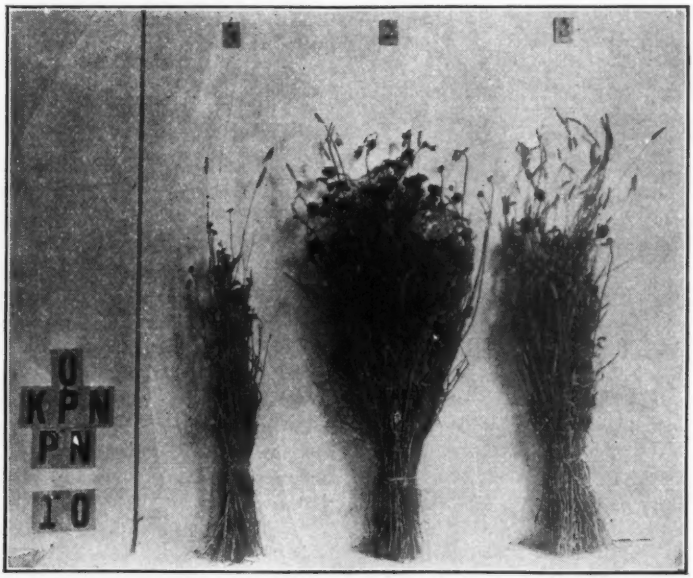
The four pots to the left contain clay soil, the four pots to the right sandy soil. The crop planted was peas. The first two pots in each soil received no potash fertilizer, while the second two pots of each soil were given the regular potash application. While the clayey soil without potash fertilizer produced a heavier growth than the sandy soil under the same conditions, the application of potash in both cases showed a material gain from its use, notwithstanding the fact that, in all the pots, the soil contained enormous quantities of potash naturally. Of the two soils used, the amount of potash in the top twelve inches of one acre, was as follows:

Clayey soil.....8249 lbs.
Sandy soil.....2110 lbs.

The amount of potash applied to the soil was about 100 pounds per acre, whereas the crop removed only about 70 pounds. This small fertilizer application of *available* potash made all the difference between success and failure on these two soils, although the sandy soil contained enough potash for 30 suc-

cessive crops, and the clayey soil for 117 and more.

The principle, that potash, phosphoric acid and nitrogen, to be useful to plants, must be in an available form, refers with equal force to plant food contained in artificial fertilizers, their agricultural value is dependent on and measured solely by the *available* potash, *available* phosphoric acid and *available* nitrogen, which they contain. Thus crude phosphate rock, while very rich in phosphoric acid, is nearly valueless as plant food, and the phosphoric acid it contains must be made soluble (available) by treatment with sulphuric acid (acidulated) and converted into "acid phosphate," so that it may become useful. The same refers to crude bones, which contain their phosphoric acid, for the most part, in an unavailable condition, and must be converted into acidulated or "dissolved bone" to become fully effective. The potash in potash salts from the German mines is all soluble in water, and, therefore, readily available to the crop. The potash contained in feldspar and other mineral silicates is insoluble and practically useless, while that contained in organic matter is slowly available. Nitrogen is also irregular in availability; in the form of nitrate of soda and sulphate of ammonia, it is readily soluble and available; in dried blood, fish scrap, tankage and manure, it is more slowly available; while in leather and wool wastes, the nitrogen is so slowly available, that



Experiment on Hay by J. F. Nolan, Eagle Bridge, New York.

		Yield—lbs.
Left	No Fertilizer	1077
Center	500 Lbs. per Acre: 3—8—10	3708
Right	500 Lbs. per Acre: 3—8—0	2519

Note the great increase in clover on the 3—8—10 plat. The bundles represent hay from equal areas.

they are well-nigh worthless as plant food.

The experiments show, first, that plants of a certain class have the power of obtaining nitrogen from the air, and converting it into such a form that it serves as plant food. They show, further, how this nitrogen may be afterwards employed to the best advantage in practical planting or farming. The reader, however, should thoroughly understand that, though these legumes have the power of securing nitrogen from the atmosphere, still they in turn must be fed with potash and phosphoric acid to promote full growth. While it is not known exactly how much potash and phosphoric acid is necessary to enable a legume to gather or produce or "make" one pound of fertilizer nitrogen, it may be estimated, by taking the composition of a number of staple legume crops. The following table shows the relative amounts of plant foods contained in several legume crops:

	Potash	Phosphoric Acid	Nitrogen
Red Clover	220	38	207
Crimson Clover	131	40	205
Alsike Clover	223	67	234
Alfalfa	168	51	219
Soy Bean—Whole Plant	108	67	232
Cow Pea—Whole Plant	147	52	195
Average	166	63	215

For 215 pounds of nitrogen, as an average, are required 166 pounds of potash and 63 pounds of phosphoric acid. That means for every pound of nitrogen "made" by the use of legumes, the crop must have used over *three-quarters of a pound of potash* and over *one-quarter of a pound of phosphoric acid.*

Much has been said about clovers "leaving the soil better than they find it," and it is the common belief that they improve the soil. This is true in one sense, but not in another. To illustrate, a clover crop, cut for hay, three tons, removes from the soil per acre about 132 pounds of potash, 23 pounds of phosphoric acid and 124 pounds of nitrogen. Of this, most of the nitogen may come from the air, but the potash and phosphoric acid come from the soil, and when the crop is removed, the soil is poorer by just that much potash and phosphoric acid. The rowen, or after-crop, contains nitrogen which may be turned into the soil; also, the roots and stubble count for something. At the same time, all must keep in mind, that the gain is in *nitrogen only*, and there is not even this gain if potash and phosphoric acid are lacking. Clover failure is very common, indeed, but a farmer rarely stops to think that exhaustion of the soil in potash and phosphoric acid may be the cause of it.

To sum up: To use legumes profitably, they must be well supplied with potash and phosphoric acid, and the crop either turned under as green manure, or used as forage and returned to the soil as farmyard manure. In either case, a sale crop, such as wheat, corn, oats, barley, potatoes, or other non-legume, should be grown, to be followed by a legume again, either the following season or the second season after. In this way less fertilizer nitrogen need be bought, and this comprises practically the whole value of legumes as a fertilizer.

IT has been said that the educated man is he who follows the standards of truth and beauty, who employs his learning and observation, his reason, his expression for purpose of ***production,*** that is, to add something of his own to the stock of the world's ideas.

The line of least resistance for the fertilizer manufacturer is to compound various ingredients without respect to their chemical properties and their relation to the soil and crop. The past two decades of increasingly intensive farming have been exemplary of the dangers of soil exhaustion, with the accompanying toxic conditions.

The ingredients making up I. P. THOMAS FERTILIZERS are specially selected to accomplish results, to minimize losses resulting from adverse weather and to furnish plant nutrition by which we mean assimilable, productive plant food.

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Philadelphia, Pa.

What Can Cooperative Marketing do for the farmer?

(*from page 11*)

kets of the world. He, in turn, must buy commodities which also have been transported great distances. In spite of the telephone, wireless, and automobiles, he is still isolated from association with his fellow man. The quantity of farm products each individual farmer has for sale is small. He is not a salesman and does not possess the necessary market information. His business is, always has been, and always will be, one of production. The farmer's condition is far from ideal, but nothing is gained by berating him and making proposals for changing his condition which do not solve the real difficulty.

There are certain evils in the present system of marketing. Private profit tends toward individual gain and some individuals engaged in marketing no doubt take dishonest advantage of the farmer. At the present moment the idea of cooperative marketing seems to be sweeping rural America. Cooperative marketing must do more than eliminate the profits of the middleman. It must make the shorter road to the consumer of real economic importance.

The marketing of farm commodities is a real service which must be performed by some one and as such must be compensated for. The present system is a product of evolution. It is the logical result of the evolution of the farmer from the self-sufficing period and the localization of industries into large units with the natural development of our large cities. Farm commodities must be transported from the place of production, the farm, to the place of consumption, the industrial centers. They must be properly prepared for such handling. They must be stored somewhere for use when needed. The individual farmer can't do these necessary things; he must have help. Such help must receive compensation. This help must be well trained and highly specialized. In a word, an extremely sensitive market machine must be developed.

Such a market machine must be controlled by one of four agencies; (1) the government; (2) the consumers; (3) the farmers; (4) or by private enterprise. The individual farmer who is primarily a producer has neither the training, ability, experience or time to personally supervise the machine. If the machine is controlled by the farmer he must hire help to man the machine. Will such hired help work in the interests of the farmer any more zealously than some one whose interest is primarily one of profit?

The business of agriculture differs from other lines of industry in a number of very important points:

(1) The quantity of commodities produced by the farmer is subject to weather and other external conditions over which he has practically no control.

(2) The farmer can control the quality of his products in only a very small degree.

(3) The farmer, owing to his isolation, is not familiar with the market demands.

(4) He cannot feed the market in an orderly manner because there are so many individuals producing the same things.

(5) He cannot quickly increase or decrease the quantity of farm products when such a change is needed.

(6) He cannot quit when the market is low.

At the close of the war there was a vast surplus of copper available and the price was low. The copper smelters met this situation by closing down for a long period or until the surplus copper was disposed of, thus throwing the burden of readjustment in the copper market on the shoulders of a great many men, such as the laboring man, the merchant, the doctor, the lawyer; each bore his share of the readjustment in the copper situation brought about by *overproduction*. The individual farmer, however, can't readjust himself in this manner.

A combination of farmers, however, can do many things that the individual farmer can't do. It can determine what the consumer wants, how he wants it, when he wants it, and then can assist him in meeting this demand. The farmer must learn what the consumer is willing to pay for. He cannot continue to produce certain commodities which he likes to produce and then expect some one to pay him cost of production plus a reasonable profit. Society won't pay for things it does not want. A farmer in Washington State last year produced an excellent crop of turnips. The yield was wonderful and the quality excellent. But no one wanted turnips and acres of turnips went to waste.

The producer must produce the things the consumer wants and is willing to pay for. A combination of farmers can more readily find out the facts in the case and determine the demand for farm products of various kinds and better assist in regulating the supply.

It is far better for all concerned for the producer to furnish the quantity the consuming public wants at a stable price. The product must also be standardized and prepared for the market in the form the consumer wants it.

Cooperative marketing has not yet solved the problem brought about by the overproduction of any farm product. The real benefits of cooperative marketing lie in the standardization of farm products, the determination of the market requirements for a given product, the control of the preparation of that product for the market, and the proper regulation of the flow of that product to the market in an orderly manner so as to prevent dumping and the glutting of the market with the lowering of the price.

The production of farm crops always has been and always will be an individual matter requiring the close personal attention of the individual farmer who is an expert on that line. The organization of farmers with cooperative marketing associations will give the farmer more control over the marketing of his products because he will know more about the market demands and how to meet them. The "elimination of the middleman" will not be a drop in the bucket in comparison.

There is no danger to the consumer in such an organization because there never can be a monoply organized for a given farm product. Farming is an individual proposition which demands the careful personal attention of the farmer. There are a number of small tasks on the farm which must be personally attended to and any improvement in the farming conditions must result largely from the individual efforts of the farmer himself.

What Fertilizers Have Done for My State

(*from page 9*)

use of better seed, more legumes and lime, crop rotations, and better cultural practices.

But, someone may say, these are only percentages and mean little. What do they mean in dollars and cents? To answer this question let us take a specific case. In order to determine the average increase, we have in each case compared the ten-year-period, 1911 to 1920, with the twenty-year period, 1866 to 1885, except in the case of cotton, where we omitted two years during the war when yields were low, due to the lack of potash. On this basis the percentage gains were as follows: cotton 62 per cent., corn 90 per cent., oats 87 per cent. Applying these to the crops of the present year we find that, on the basis of present prices for cotton and cotton seed, the crop is worth $144,000,000. The value of the total gain is $55,000,000 in round numbers. Fertilizer's share is $37,000,000. Making our calculations in the same way we find that the value of the gain due to fertilizer for corn is $15,500,000, oats, approximately, $2,000,000. While we have no accurate figures for tobacco, it must have shown a similar gain, and we assign as a conservative estimate of the value of the gain due to fertilizer on this crop $5,000,000. This means that fertilizer increased the value of these four crops $59,500,000. But this is not all profit. We must deduct the cost of buying and applying the fertilizer, which we estimate at $20,000,000. This is charging against the four crops listed above 90 per cent. of all the fertilizer used in the state and leaving 10 per cent. for truck and other crops. We must also subtract the cost of harvesting and marketing the increased yield of these crops. We estimate these costs as follows: Cotton $5,500,000, corn $2,000,000, and oats $500,000. Subtracting all these charges from the value of the increase due to fertilizer we have remaining $30,500,000 as a net profit on an investment of $18,000,000 in fertilizers. This is 169 per cent. interest on our investment as a state for 1923.

Was 1923 an exceptional year or can we expect these results to be repeated? Only one year in the past thirty has fertilizer failed to pay a profit. In 1920 we paid a very high price for fertilizer and used much of it. Deflation came before we could market the crop, with the result that the increased yield of cotton resulting from the use of fertilizer for this year could not be sold for enough to pay for the fertilizer and the cost of harvesting the increased yield. The average for the ten-year period, 1911 to 1920, gave a profit from fertilizer of more than 50 per cent. It has probably averaged above fifteen million dollars annually. For the ten years that is one hundred and fifty million dollars.

But I started out to tell you what fertilizer has done for my state. So far I have told you only of the increased crop yields, and the money it has brought to the state. What has this money done for my state? It has built comfortable homes, churches, public schools and colleges. It has bought automobiles, trucks, and tractors. It has built good roads and constructed bridges. It has changed many thousands of acres of our poor, unproductive

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sandy soils into some of the best agricultural communities in the United States. In short, it has made possible a prosperous agriculture where without it there could be only abandoned farms and poverty.

Mr. Blackwell gives us the following facts about himself:

I am a native of Texas, grew up on a ranch, graduated from Oklahoma A. & M. College, 1911; took a Master's degree at University of Wisconsin, 1915; taught in a city high school between those two dates; taught Agronomy for three years in University of Texas; attended Cornell University three semesters and was assistant in department of crops at that institution two semesters; have been chief of Agronomy Division, at Clemson College, since August, 1918.

Missiles and Mignonettes

Certainly enjoyed your booklet BETTER CROPS.—*Geo. A. Stuart, Bureau of Markets, Harrisburg, Pa.*

BETTER CROPS is very helpful to me in my work.—*J. T. Belue, Clayton, Ala.*

The "Jeffisms" have more point and punch than poetry, but I like 'em. Keep a-goin'.—*W. C. Salter, La Fayette, Ind.*

The editorials in BETTER CROPS are well written and quite to the point.—*F. W. Seck, Director Agr. Extension, St. Paul, Minn.*

Like BETTER CROPS fine. It's brief and contains about as much as a county agent has time to read. Trot it along, will be looking for the December number.—*J. W. Helms, Cullman, Ala.*

I had been saving previous copies of BETTER CROPS. Had placed them on a shelf for future reference—which generally means to forget things. Took time to read this issue, then went and dug out the others and read them. Now they are "on file" instead of being piled up "for future reading." Thanks awfully.—*Russell G. Briggs, Auburn, Ala.*

I have enjoyed reading the one copy of your publication which has come to hand. I like the idea of terse articles with especial leaning toward the matter of profits. I believe that one of our functions as agriculturists should be the continual dwelling on such subjects rather than repeating the old adage of plowing deep.—*C. R. de Ong, University of California, Berkeley, Calif.*

Toiling the Hay in the Bruley

(*from page 16*)

surprised tone as we drove into the yard. " 'Test farm' on that sign. Wonder what it means."

We soon found out for, while Charlie wore overalls and presented a wiry leather-necked appearance similar to our first farmer—there the resemblance ceased.

"Why, boys, do I like farming? Nothing better. Things have changed since you left the farm. Just let me show you what we're doing.

"See that field? That's my own new strain of potatoes grown under test conditions for the last four years. It took some time to get me started, but the county agent knew his business. I have been studying spraying and fertilizing with him and we've worked it out just like a laboratory. This year every potato in the crop was ordered for seed before they ever sprouted.

"See those two fields of corn across the creek? There's a big contest on over there. Young Charlie used 2-8-2 on his and your namesake, Tom, is trying 3-8-4 and they can't wait till harvest to see which one wins."

"Here," interrupted Tom, "you're getting too technical for us. What does it all mean?"

Charlie tried to tell us, but we hadn't the equipment to understand the details. We did learn in our short visit that Charlie and some of his neighbors understood seed fertilizers, and labor-saving devices, and the others were falling into line. They took courses at Cornell, had frequent visits from experts in every branch of agriculture. They subscribed to farm papers and were eager for new ideas.

They were making money, too, and best of all, their sons and daughters were finding farm life interesting. Young Charlie and Tom had been members of calf clubs and pig feeding clubs. They had visited test farms in half a dozen counties and had contact with trained men who swapped ideas and experiences with theirs. There was still plenty of hard work for all, but they could see the results and could measure their progress. It was fascinating to us, and bewildering.

"Well, well," said Tom as we started for home. "I didn't think it possible. It's none of my business, but when we go fishing next year, I'm going to tell that fellow up in Canada to buy some fertilizer and subscribe to some literature that will tell him how to use it."

Thirty miles later—

"Did you hear what Charlie said about hay? Prepare the soil and select the seed and average 2½ tons to the acre. Only one acre to 'toil' against three in our day. That farm bureau agent is a credit to his profession."

Another thirty miles—

"Believe I'll study this thing and buy a farm myself. My own boys are coming along and I'm going to give them a chance, anyway. The same chance you and I had, but we passed it up."

Co-operation with the Farmer

The American Agricultural Chemical Company is more than a fertilizer manufacturing concern. It is a constructive force in the development of modern agriculture. Our formulas and manufacturing methods have kept pace with the findings of the scientific workers, and the influence of the company in improving crop production has been great.

An important factor in this work is our Agricultural Service Bureau which has co-operated with farmers for years in discovering important facts about soils and crops. This Bureau has been conducted since its inception by Dr. H. J. Wheeler, formerly Director of the Rhode Island State Experiment Station, a man whose authority on soil matters is beyond question, and whose advice is at the disposal of farmers and others interested in the solution of soil and fertilizer problems. Our Agricultural Service Bureau is for your use; consult it freely!

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Are Economical Wives Economical?

(*from page 6*)

"Why, surely," replied the salesman's wife, wonderingly.

"Well, it can be done," said Norvell. "If wives and their husbands too, for that matter, would spend as much time thinking out means for increasing their income as they now spend in squeezing out the pennies to be saved, they would be far happier, live better and still put as much money away for the rainy day as they now accumulate."

"There is not a man, whether he be a salesman, scientist, farmer, doctor, writer, clerk, lawyer, or any other trade, profession or calling that cannot increase his income by doing better work. If he is working on a civil service or government job which carries a certain specified salary, he can increase his efficiency to a point where dozens of other opportunities will be showered upon him—at greater salaries—*if* his wife will help him do it."

"You go home, and prepare yourself for John's homecoming, Mrs. Jones. When he comes home he will be tired, disgruntled, discouraged and worn out, from contact with men. You should be there, dressed pleasingly but not expensively, to greet him, to cheer him up. Let someone else prepare the dinner. You coax him out of his despondent mood—and I know he will be despondent, for no man can travel two months away from home meeting all kinds of human beings without feeling the hopelessness of it all. The next day both of you come down to my office and we will talk over a plan I have in mind."

THE woman agreed — what could she do? Norvell was her husband's chief—had the privilege of crossing his fingers and her husband would be on the street.

When John returned Norvell told him the plan. The wife was to take each day a record of the calls he made, list what he sold, card index the sales by commodities, and make numerous records which her husband was too busy to make. Then on the next trip, he would have in his pocket a complete history of the previous trip and could govern his sales talks accordingly.

The plan worked even better than Norvell anticipated. So interested did this little woman become in her husband's work that she found numerous ways to help him sell—invented a way to enter the peculiarities of each of his customers on a card—when he went into the store he could greet the buyer with "Hello, Charles, hear your daughter won first prize at Smith for oratory! Good stuff!" putting his prospect into a friendly frame of mind, and opening the avenues to bigger sales; sent him encouraging letters almost every day; totaled his sales by saws, nails, hatchets, planes; in fact, she worked up a complete little business system all of her own.

In two years this man was leading all of the others. In five years he was vice-president of the company—and still is. His salary today is thousands where at the time Norvell first introduced his plan it was hundreds.

His wife, through Norvell's planning, ceased to think of saving, squeezing, and pinching, and turned her thoughts to increasing her husband's efficiency—sent him out each trip with his head high and courage in his heart. He feared no man; nor

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was he in danger from any woman. His wife was now as attractive as the year before he married her. Her hands were soft, appealing—no practised flirt could steer him off the straight and narrow.

This happy couple saved more money in one year, after the plan got to working, than they would have saved in five years by plodding along in their disgruntled, penny-squeezing way. They were happier, and the wife has lost none of her attractive femininity—she had even more time to spend with her children, and the hours she spent with them were not harassed and worried—she was calm, at peace with the world, and in complete possession of her soul.

Thrift does not mean stinginess. Saving starts with making. Incomes come before bank books. Thrift means careful spending; *but it means getting the money first!* Do not think that because you saved a dollar today by going without a book, that you can pat yourself on the back for your mental courage and your ability to withstand temptation. Perhaps had the time you spent arguing with yourself whether to buy the book or not, been spent in quiet thinking of your position in the world and how you might increase your efficiency, it would have yielded you five dollars in return—a dollar for the book you wanted and four for the savings account.

Some people get just so far up Income Road—then lay down under a tree and contentedly chew their cud. Some wives seem content if, by slaving and grinding, and worrying and fretting, and squeezing and pinching, they can put away fifty dollars a month. Fine! A noble sacrifice and an honorable ambition. The good book says, "Woman

was created to be an helpmeet to man." So be it! But the greatest help to a man is brain-help, intellect-help—not dollar-help.

Even the tight-wad husband who remarks to his wife, upon her application for a little more dough, "What became of the dollar I gave you last month?" will react favorably to suggestions for improving his income—it shows that wifey is thinking along the right lines.

I don't know whether what I here write will reach the wives of my readers. Chances are that some readers will carefully mark this page and leave BETTER CROPS where it will surely be seen by the better seven-eighths; others will destroy the issue completely and at once, as they would a Robert G. Ingersoll Memorial Edition—for fear it might put some fool ideas into a head in which a flea would rattle around like a skeleton on a tin roof. It all depends upon the reader!

But, the truth is there—regard it how we will. Economical wives are not always the most economical in the end. They are sincere, hard working, honest in their intent, but are simply working down Misguided Avenue, when they should be spiritedly dancing up Realhelp Boulevard, chin in air and thoughts on improving hubby's income—so that there will surely be something to save.

Let the "little woman" in on your plans—let her see what you are up against in your manly struggle to bring home the bacon. Let her get her teeth-and-talons set into the skin of your problems, and trust woman's intuition for the rest. I know what your answer is: You can do it with some women, but—.

Yes, there is always a "but" with some people, as there is with a goat! But let me tell you something else, brother: scientist though you may be, county agent, professor of agriculture, county farm bureau president or chief-oiler-of-the-hinges-of Sohelpme, you can appreciate plain talk, and that is the only kind you ever get from Old Jeff—the greatest danger to a happy married life, and especially the married life of a man whose income is derived from his brain, is that he will advance faster, farther and more certainly than his wife!

Is there anything more pitiful to see than a splendid scientist or business man or doctor reading a deep book, that not one person in a hundred could understand, only to be constantly interrupted with inane nothings interpolated by his wife! He is reading,"—and the fifth derivative is a philological contemporaneous viewpoint that rarely coincides with Freudian theory," when she interrupts with, "Did you ever notice that leather heels wear down faster than rubber, John?"

Well, it's his fault—he kept her in her own sphere—felt that she could not possibly learn enough to keep up with him, and anyway, a woman's place is "Kind, Kirk and Kuchen." Finally there is not one plane upon which she can meet him—not even the physical. She is not his equal mentally, nor his match in any other way. *Then the trouble begins!*

Brother, do some thinking. Don't brag because your wife is a good saver; nor cuss because she is a spendthrift and you will probably end up in the poorhouse. Let her help you earn the income and she will equal you in saving.

And now, if you want to show her this, go to it!

Captain Kidder comments on this month's issue

Jeff's article on economical wives is likely to start some lively family discussions. I haven't made up my mind whether to show it to Mrs. Kidder or not. If I do, she's very apt to give me her ideas about *un*economical husbands. I can't help wondering if Jeff tried it on his Missus. If so, he won't have much comeback when he gets next month's bills from the dressmaker. Seriously, though, he's right about husband and wife planning together to *increase* their income. I don't know many cases where it's done, but all I do know of have been surprisingly successful.

Mr. Brand's articles are just the kind I like—full of interesting facts told in an entertaining, readable style. I hope we get more from him, don't you?

While on the subject of Mr. Brand's articles, I might mention an error in his first article which appeared in the November issue and which Mr. Brand called to my attention. He wrote that "it is probably safe to say that a billion and a quarter dollars' worth of products" will be marketed cooperatively in 1923. In print it appeared "a million and a quarter"—only a little over $999,000,000 out of the way.

Maybe some one ought to take a try at kidding me. Last month during a temporary brain storm, I referred to Albert Hansen as "Anderson." Perhaps his poison plant stuff went to my head. Anyway, I offer him my apologies. If he keeps on exposing these deadly weeds, we won't dare let cattle out to graze. All their fodder will have to be hand-picked.

Be sure you read that letter from Brother Mulder on page 39. It's chock-full of common sense and sound reasoning. I'd like to see more of the readers of BETTER CROPS writing good, straight-from-the-heart letters like this. How about it?

One of the things BETTER CROPS aims to accomplish is to end this "robbery of the soil" that Mr. Mulder speaks of, and to show how the units of plant food may be *increased* instead of decreased. Mr. E. K. Howe's letter shows very graphically how we are robbing the soil of one essential plant food—potash—and Jeff's editorial suggests a good means of remedy.

That $50 in gold must have looked pretty good to Brother Blackwell. Wonder what he'll do with it? Probably start saving for a Rolls-Royce.

I read Irving Price's article over several times, but I'm still in the dark as to just what the "bruley" is. How about it, Irv.?

A good many agriculturists have got the idea in their heads that cooperative marketing is the great cure-all for everything that ails the farmer. Far be from me to deny that it can and does accomplish a lot. But I wish everyone interested in it would read Dean Stewart's article carefully. His careful logic and reasoning should be a corrective to a lot of careless assertions that are being made.

Captain Kidder

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Yield: 45 Bushels per Acre	Yield: 90 Bushels per Acre	Yield: 75 Bushels per Acre

Potash Pays on Corn

AN investment of $2.25 in muriate of potash increased the yield 15 bushels in the above experiment. Corn needs potash and, when it is liberally supplied, firm, full ears and superior quality are secured—as well as increased yield. Remember that the average yield of corn takes 100 pounds of potash from the soil per acre. See that plenty of Genuine German Potash is used to secure the best results.

POTASH IMPORTING CORPORATION OF AMERICA

81 FULTON STREET
NEW YORK CITY

GERMAN POTASH IS BEST FOR CORN